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Some Observations on Autopsy Technique and on the Selection of Material for Laboratory Examination*

E. G. WHITE, B.Sc., M.R.C.V.S.,

RESEARCH INSTITUTE IN ANIMAL PATHOLOGY,

LONDON

Post-mortem technique can only be satisfactorily dealt with by demonstrations on the carcase and the methods used vary not only with different species but also in animals of the same species according to the clinical history and the type of examination required. There is no hard and fast method of autopsy technique and I propose, therefore, to confine my remarks to a few general suggestions which may perhaps be of assistance to the practitioner.

All the modern advances in pathology have not shaken the fundamental importance of pathological anatomy as the basis of our knowledge of disease. It is the rock on which clinical medicine and surgery are built. Its task is to explain the development of disease from its inception—it is not merely a descriptic and diagnostic discipline. "As is our pathology so is our practice" (Osler). "Unless surgery is built on a solid foundation of pathology the surgeon is no better than a hewer of flesh and a drawer of blood" (Boyd). The surgeon should be familiar with the gross appearances of diseased tissues and should have sufficient knowledge of pathological histology to enable him to interpret the diagnosis of the laboratory worker. The fundamentals of pathology must be studied at the *post-mortem* table for it is there that the effects of disease are laid bare and mistakes in diagnosis and treatment revealed. Whenever the opportunity is offered the practitioner would be well advised to make a thorough and methodical autopsy and interpret it in the light of the clinical history.

An autopsy in the narrower sense is the opening of the carcase and the orderly dissection of all the component parts. In many cases, however, this procedure needs to be supplemented by special methods of study of various kinds, *e.g.*, bacteriological, histological, chemical, etc.

In some cases it may be advisable to kill an animal in the late stages of disease rather than allow it to die, probably from some secondary infection which may obscure the changes produced in the tissues by the primary disease. In an outbreak of disease in which several animals die it is advisable to carry out an autopsy on as many as possible as in this way various stages in the development of the disease may be recognised and diagnosis rendered easier. The same applies when the examination is to be made at a laboratory—it is better to send in two animals for examination if available.

The examination should be made as soon as possible after death in order to avoid confusion between *post-mortem* changes in the tissues and those which took place during life. Owing to the poor heat-conducting property of adipose tissue, fat animals will reach the temperature of the environment more slowly than thin animals and will therefore undergo more rapid *post-mortem* changes. For this reason, carcases which are to be kept for some time in a refrigerator should first be opened and the internal organs exposed. Nervous tissue, kidney, liver and pancreas very rapidly undergo autolysis, whilst lung tissue, muscle and cartilage and bone are affected more slowly. The examination of fresh material is especially important if bacteriological or cytological methods are to be employed, *e.g.*, on the blood or central nervous system.

A careful external examination should always precede the opening of the carcase. Whenever possible the animal, whether large or small, should be placed in the dorsal position as this results in the minimal displacement of the internal organs when the carcase is opened. An important rule is never to displace any organ or attempt to remove it until its relation to the surrounding tissues has been examined. To look before cutting is a very useful maxim.

The initial skin incision from the mandibular symphysis to the brim of the pubis should

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where necessary be modified to encircle the navel (in young animals), operation wounds, etc. The navel or wound should be left in a small islet of skin and abdominal wall until the underlying tissues have been carefully examined, *e.g.*, for evidence of peritonitis. In the case of the navel, the umbilical vessels should be carefully opened with fine scissors and examined for evidence of omphalophlebitis.

The subsequent technique may vary within wide limits, but it is always advisable to open the thoracic cavity after opening the abdomen and before removing any of the abdominal organs. In this way the pleural cavities and the thoracic organs can be inspected before being altered either by the entry of material from the abdominal cavity (exudates, etc.) or by loss of blood from the large abdominal vessels.

If an exudate has been diagnosed clinically within the pleural or peritoneal cavity, and bacteriological examination is intended, the thoracic or abdominal wall should be seared with a hot spatula and some of the fluid withdrawn in a sterile pipette and transferred to a sterile bottle or tube for bacteriological examination. One or two smears of the exudate should be made at the same time and fixed by heat. If anthrax is suspected thick smears of blood are made from a peripheral vein and examined before the carcase is opened.

One method of autopsy technique consists in the removal of the whole of the internal organs in one piece and their subsequent dissection outside the body. This procedure is not to be recommended except in small animals with a simple alimentary tract or in birds. The usual method is to remove groups of organs which are functionally or anatomically related, *e.g.*, the alimentary, respiratory, urinary systems. Alternatively, each organ may be removed separately after examining its relation with other organs. We prefer a combination of these methods. For example, if icterus is present, the duodenum is opened *in situ* and the patency of the bile duct is examined by pressure on the gall bladder and expulsion of bile through the duodenal papilla. The liver, stomach and duodenum may then be removed together. Similarly, if incision of one kidney *in situ* reveals dilatation of the renal pelvis, the urinogenital system is removed whole. In birds and carnivora, the alimentary tract from stomach to anus may be removed together but in ruminants and the horse it is better to make use of double ligatures of twine and remove the various portions of the alimentary tract separately, *e.g.*, stomachs, small intestine, large intestine. The adrenals are incised before removal of the kidneys.

In small animals, removal of the cervical organs should always be carried out so as to include the tonsils and pharynx. (A pair of strong scissors with short stout blades and capable of cutting tin is a very useful instrument for such purposes as cutting through the hyoid bone, costal cartilages, etc.)

After inspection of the thoracic organs it is usual to remove the abdominal organs and then continue the examination and dissection of the thorax. The exact procedure may need to be modified according to the findings, but in any case the examination must be *methodical*, otherwise a number of organs—especially the pancreas, adrenals, prostate, thyroids, numerous lymph glands, etc.—will be forgotten.

The points about any particular organ include its position, size, shape, colour, odour, consistence, surface markings, appearance of cut surface, fluid exuding, contents (if a hollow viscus), etc. Organs should be opened by a series of incisions so as to exclude the possibility of failing to discover small lesions. If material is to be sent to a laboratory for examination, one or two lesions should be left unopened. In this connection, small early lesions are usually more useful for examination than are older lesions which may have undergone secondary changes such as necrosis, haemorrhage, calcification, etc.

In view of the wide variations in the size of the animals with which we have to deal, the weight of an organ or the volume of fluid are of little significance unless the approximate live weight or carcase weight of the animal is known.

Selection of Material for Laboratory Examination

Whenever possible, the complete unopened carcase should be sent by the most rapid method. If the material is sent by passenger train the time of arrival and destination should be communicated to the laboratory by telephone or telegram. Full details of the clinical history and type of examination required should always accompany the specimen or should at least arrive at the laboratory not later than the specimen. If this is not done valuable time is lost which in some cases may result in *post-mortem* changes which obscure the cause of death; this is, of course, especially important if bacteriological examination is required. The laboratory worker is no magician and cannot be expected to carry out his work efficiently in the absence of a full account of the history of the case and a suggestion of the type of examination required.

When it is not possible to send the complete carcase, *e.g.*, in the case of large animals, representative material should be sent—preferably large pieces of organs or whole organs. Material should be selected which shows typical lesions, some of which should not have been opened. If bacteriological examination is required no antiseptic or preservative of any kind must be used

and the material should be removed from the carcase as early as possible during the autopsy, with reasonable precautions to avoid contamination. It should be wrapped in sterile lint or gauze and the different tissues should not be allowed to come into contact either before or during transit. It is quite useless—although unfortunately, all too common—to send small pieces of intestine, liver, lung, kidney, etc., thrown together in a tin and then to expect a bacteriological examination. It is always advisable to include with the tissues their respective unopened lymph glands.

When histological examination is required it is suggested that two or three pieces of tissue, not more than one-quarter inch in thickness and the area of a postage stamp, should be sent in a wide-mouthed bottle of fixative. The tissue selected should include a small area of normal tissue whenever possible. The most suitable fixative is 5 per cent. formalin in tap water or normal saline. Spirit is unsuitable as a fixative. It is important to fix small pieces of tissue in a relatively large volume of fluid, *e.g.*, two or three pieces of tissue in at least 100 c.c. of fixative. The use of wide-mouthed bottles with bakelite screw-top covers is to be recommended; the bottles are cheap and are almost unbreakable.

The advantage of sending small pieces of material in fixative, in addition to sending the remainder of the tissue in the fresh state, is that frozen sections can be cut immediately at the laboratory and frequently a diagnosis can be made within a few hours of arrival. In some cases it may be necessary to embed material in paraffin if frozen sections fail to give a satisfactory picture. In the case of biopsy material, *e.g.*, neoplasms removed at operation, the sending in of material in formalin—the whole neoplasm after incision if small, or small pieces if large—should be adopted in order to facilitate rapid diagnosis.

Parasitological Examination.—In the case of small animals the stomach and intestines should be ligatured separately and sent unopened. In large animals representative portions of the alimentary tract should be submitted. The separation of parasitic worms from the gastric or intestinal contents by sedimentation is tedious and is best carried out at the laboratory provided that the material can be sent while still fairly fresh. Individual specimens of parasites should be despatched in wide-mouthed bottles in 5 per cent. formol saline. Parasites, especially tapeworms, attached to the stomach or intestinal wall should not be detached but sent complete with a small piece of the wall. Attempts to detach the parasite usually lead to the loss of the head on the characteristic features of which diagnosis may largely depend. Organs containing lesions suspected of being parasitic in origin are sent in the usual way, care being taken to include one or more unopened lesions.

Bottles containing parasites for identification should contain a pencilled label giving the name of the host, the locality, position of the parasite in the host, date, and the method of preservation.

Material for Chemical Analysis.

The autopsy should be made with great care and full notes should be taken. The surroundings of the body, feeding, accessibility to sources of poisoning or of persons likely to have malicious intent should all be noted. A search should be made for poison or poisonous plants and any such material should be preserved and sent to the analyst. It may be advisable to send the carcase direct to the pathologist together with a complete record of the clinical history and allow him to decide whether after carrying out an autopsy a chemical analysis should be undertaken. He will then hand on to the analyst suitable material. Whenever possible, the unopened carcase should be submitted for analysis. Alternatively, the material sent should include the ligated stomach and intestines, liver, kidneys and urine in separate clean glass bottles or jars. The materials must not be mixed. No preservative or antiseptic must be added. In the case of large animals about a pound of the stomach contents and a portion of stomach wall and similar material from the intestines and other organs should be submitted.

The receptacles must be sealed and clearly labelled with the nature of the specimen, sender's name and date, and, if legal action is likely, with the signature of a witness. As with other types of special examination, the findings have to be considered in conjunction with the symptoms, *post-mortem* findings, drugs administered during life, etc. It is clearly impossible to employ a routine method of analysis which will detect every possible poisonous substance—in fact, all substances are poisonous if taken in sufficiently large doses. Full details of the case should, therefore, be given and, if possible, some indication of the poisonous agent for which the analyst is expected to search.

Water.—The bacteriological examination of water is best carried out by a laboratory which frequently undertakes this work, and several samples from the same source should be examined and compared with water from other sources. It is important to take a representative sample for examination, *e.g.*, from the middle of a stream or pond rather than from the edge. The container used for taking the sample must be sterilised before use; in the case of a pump special precautions would be needed, and a filter should be removed from a tap before a sample is taken. The values obtained are only comparative and their

significance depends on the purpose for which the water is intended and on the source of the water, *e.g.*, pond, shallow well, deep well, etc.

For chemical examination at least half a gallon of water is required and a representative sample should be taken into a clean container with the precautions mentioned under chemical analysis above.

Milk.—A suitable amount of milk for bacteriological examination is six ounces taken in a bottle sterilised by boiling (not forgetting to boil the cork). In the case of a churn or tank of milk, thorough mixing should precede taking of the sample. If samples are taken direct from the udder this should be well washed and the first few drops of milk discarded. Clear indication should be given as to the type of examination required—whether a bacterial count or the methylene-blue reductase test—also, if tuberculosis is suspected, this should be stated at the time of sending the sample. The sample may be required from a single quarter or from more than one quarter.

Blood.—For cytological examination thin even smears should be sent to the laboratory without previous fixation. The blood should be taken during life from a peripheral vein, care being taken not to interfere with the vein before taking the sample, *e.g.*, by friction or the application of irritating antiseptics to the skin. Cell counts and haemoglobin estimations should be made either at once or at least within a few hours. Results on oxalated blood sent through the post are not very reliable. In cases of gross blood abnormalities smears of blood made at autopsy may be of use, but the finer changes can only be studied on perfectly fresh smears made during life. Smears are best sent through the post in pairs separated by matchsticks and fastened together with an elastic band or adhesive tape. They may be sent in suitable wooden boxes; this applies equally to smears to be examined for the presence of bacteria, *e.g.*, from blood, exudates, organs, etc. (Two or three smears of blood, pus, etc., fastened together as suggested can be packed in a "Swan" matchbox, into which they will fit very securely.)

For the biochemical examination of blood special methods of collection are used and the requirements vary with the laboratory concerned; in most cases both oxalated and clotted blood are required.

Blood, exudates, pus, etc., intended for bacteriological examination should be collected under aseptic precautions into sterile bottles or tubes (5 to 10 c.c.) and one or two smears should be made at the same time. The latter will indicate the condition at the time of taking the sample and will assist in determining the changes which have taken place in the bacterial flora during transit.

Swabs.—This is a suitable method for sending in samples of thick pus present in small amounts; larger quantities should be sent in a bottle or tube. Swabs are easily obtainable from a laboratory and care must be taken not to contaminate them. No antiseptic must be applied to the part to be swabbed, *e.g.*, vagina, but it may be cleansed with a little sterile wool moistened with sterile saline. A smear should be prepared at the same time and submitted together with the swab. It is important that swabs should arrive at the laboratory as soon as possible as some organisms may otherwise fail to survive, due to drying and to multiplication of the more prolific ones.

Urine.—Quantitative methods are of no value on single urine samples. The urine secreted varies widely with the diet, fluid intake and amount of exercise, so that quantitative values are only of significance when made on 24-hour samples. A six- or eight-ounce bottle should be sent when possible if a bacteriological examination is not required, and a few drops of toluene should be added to prevent bacterial multiplication. Samples should be taken with a sterile catheter if bacteriological examination is to be of value.

Urine examination by the practitioner is only advisable when carried out fairly frequently since the interpretation of the results necessitates some experience. Special caution should be observed before giving a diagnosis of diabetes mellitus. A greenish coloration after boiling the urine with Fehling's solution does not prove the presence of diabetes mellitus. A clearly marked reddish precipitate of cuprous oxide indicates the presence in the urine of glucose, laevulose, lactose, glycuronates, uric acid or creatinine (in concentrated urine). A positive test with Benedict's qualitative reagent indicates the presence of glucose, laevulose or lactose only; glucose and lactose can be distinguished by fermentation with yeast or by preparation of the osazone. A diagnosis of diabetes should only be made if repeated examination of urine samples has shown the presence of glucose. More than one test should be used in each case, and it is advisable to confirm the diagnosis by submitting a blood sample to a sugar estimation.

Faeces.—These should be collected direct from the rectum and a two- to four-ounce tin should be filled with a mixed 24-hour sample. The number of eggs of parasitic worms found in the faeces varies widely from day to day and is not necessarily directly proportional to the number of adult parasites as some species are more prolific than others. In the case of horse faeces it is not possible to differentiate the eggs of the more pathogenic species from those of less pathogenicity nor to estimate with

any degree of accuracy from an egg count the severity of the infestation. The clinical history is as important as the egg count and too much significance should not be attached to the latter. Accurate counts are largely a waste of time when made on single samples of faeces taken from the floor of the stall and not considered in relation to the clinical history of the animal.

Packing of Specimens for Transmission through the Post

Liquids must be sent in bottles, firmly sealed and enclosed in a box of wood, metal or strong cardboard opening at one end only and having a firmly fitting lid. Sufficient absorbent material should be included, to prevent leakage of fluid if breakage should occur. The package should be marked "Fragile, with Care," and labelled "Pathological Specimen." (Infringement of the Post Office regulations renders the sender liable to prosecution.)

Organs and tissues should be sent in tins, jars or wide-mouthed bottles, hermetically sealed and packed within a box so that they cannot shift about.

In order to obtain the best and most efficient service from a laboratory it is necessary that specimens should be collected and despatched correctly. This is as necessary as the proper laboratory technique and if not carried out the laboratory examination may be useless. If a specimen is worth sending in it is worth while to take the time and trouble to send it properly and include the necessary data. One of the most important reasons for teaching students pathological technique is that they may be able to understand the common laboratory methods and possess the knowledge needed to select suitable material for examination, know how to send it and, perhaps more important, know what type of examination is required and how to interpret the laboratory report.

In this connection it is necessary to mention that the laboratory report is intended to help the practitioner in making a diagnosis and he no less than the laboratory worker has a part to play in the successful carrying out of the examination. In many cases the laboratory report will confirm the diagnosis of the practitioner; in others it will of necessity be at variance. In the latter case, as in carrying out autopsies, one must keep an open mind and be prepared to alter one's opinion in the light of subsequent findings. The autopsy or other laboratory report should be an honest statement of the facts strengthened by the expression of an opinion and should be interpreted by the practitioner in the light of his own observations.

It is hoped that these very scattered observations may assist the practitioner in deriving additional benefit from laboratory facilities as well as in providing the laboratories with a wealth of valuable material for teaching and research. A closer understanding between the practitioner and laboratory worker and an appreciation by each of the difficulties of the other cannot fail to be of value to both. If this paper has contributed anything towards that understanding it will have served its purpose.

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Discussion

Mr. F. W. Withers, M.A., M.R.C.V.S., of the Institute of Animal Pathology, London, who opened the discussion, said: I should like first of all to congratulate Mr. White on his paper in which he has dealt, within a reasonable time, with the main points concerning *post-mortem* methods, and the general principles governing the sending in of suitable material for laboratory examination.

As we work together, it seems to me that it will be more appropriate if, in opening the discussion, I try and make my remarks supplementary to those of Mr. White. I have also been told that a few details as to our findings in *post-mortem* examinations at the Royal Veterinary College may be of interest to you and I will, therefore, endeavour to review briefly our cases of the past year.

My own short experience freely bears out the axiom that it is only by actually carrying out *post-mortem* examinations that one can acquire a useful knowledge of pathology. Careful record of the findings at the time and an honest endeavour to interpret them necessitates reference to the literature and only in this way is real progress possible. There is also brought home to one—what is perhaps too often overlooked—the idea of the "*pathological process.*" It may take a considerable number of related cases to make one realise clearly the gradual transition from the normal to the clinically diagnosable condition with its well-marked changes in the appearance of organs. There are no fixed definitions or descriptions and any attempt to interpret disease in mathematical terms is doomed to failure.

To get the best out of *post-mortem* examinations it is, of course, essential to have at our disposal the various subsidiary means of investigation—histological, bacteriological, etc., and only by a quite impartial consideration of the clinical picture plus the *post-mortem* findings, both macroscopic and minute, can a true assessment of a case be made. Quite frequently—to be perfectly honest—it is quite impossible to solve the problem. It is said that a pathologist can always be relied upon to state "the cause of death," but he only too frequently knows in his own mind that although the story sounds plausible enough, we are a long way from really explaining very many of the cases which confront us. It is the slow accumulation of

evidence that solves problems in the end—and the more witnesses there are, and the more varied and extensive their experience and knowledge, the better.

The busy practitioner, even if he has the inclination, rarely has the time to carry out many *post-mortem* examinations, and those that he does carry out himself cannot be done in such detail as is expected from those whose primary duty it is to do such work. Moreover, the practitioner has not the facilities or the specialised knowledge necessary to do the subsidiary investigations. It is only at a well-equipped institution where there are specialists in the various branches that a full investigation of a given case can be made. However, I think all practitioners should do some post-mortems and keep contact with laboratories, just as I think that laboratory workers should take any opportunities they can to see a little practice occasionally. We thereby get in touch with each other, learn to see the other man's point of view and difficulties, and such co-operation cannot but do good. It is to the practitioner who wishes to do an occasional *post-mortem* examination himself and perhaps as the result, to send material to a laboratory for diagnosis that Mr. White's paper is mainly addressed.

I think it is even more important that the practitioner should wear gloves for *post-mortem* work than the laboratory worker. After all, he may be operating the same day on an animal of the same species and the danger of carrying infection from the *post-mortem* table to a patient is very much greater than the danger of personal infection from animal to man. We are, of course, lucky compared with those engaged in human medicine in the comparatively few risks of infection we run. It is also desirable that a set of instruments should be kept for *post-mortem* work which are not used for any other purpose.

The minimum equipment is probably as follows:—

1. A long-bladed (*e.g.*, six-inch) knife with heavy, roughened handle.
2. Scalpels, or one small knife and one scalpel.
3. Pair of forceps.
4. Scissors—one short-bladed stout pair; one lighter pair.
5. Bowel scissors with ball or rounded end rather than a hook-end.
6. Saw with detachable back.
7. Celluloid rule.
8. Probe.
9. Director (useful).
10. Ball of twine.
11. Sponges.
12. Table knife or spatula for searing.
13. Bakelite stoppered bottles for specimens —as mentioned by Mr. White under material for diagnosis.

In actual practice large animals are usually opened at the slaughterhouse. When it is necessary to do it for oneself, nothing is so efficient as a good-sized saw for opening the thorax. For small animals a pair of human rib shears is useful; but for dogs up to medium size, and for cats, the ribs are easily and efficiently cut with a pair of stout, short-bladed straight scissors—the sort of scissors used to cut tin—which, however, need frequent sharpening.

With regard to the actual procedure, Mr. White has made some general remarks about this. Special cases, of course, demand special methods and one must always be ready to vary one's technique to suit a particular case; but *generally speaking there is nothing like having a routine method and order of procedure for all ordinary cases.* This ensures reasonable speed after a little practice, and also prevents one missing things, which so easily happens unless one is working to a well-thought-out method which has become almost second nature by practice, *e.g.*, various lymph glands which may subsequently prove important, adrenals, thyroids, etc. If a case is of sufficient interest to be recorded, and therefore added to the mass of data available for reference, it is surely worth doing thoroughly and recording accurately. *Notes should be jotted down at the time.* Personally, if doing a *post-mortem* examination without any assistance, I find it best to proceed to the stage of removing and opening up all the necessary organs, etc., and then with everything laid out conveniently, to wash one's hands and proceed to write up notes in the order laid down on the *post-mortem report form,* which ensures that one misses nothing important. For a really interesting case which one may wish to report fully or to write up for a journal, weights of the carcase and the principal organs are important; and measurements of lesions, tumours, etc., are much more satisfactory and accurate than vague comparisons with common objects.

A point worth mentioning here is that the *post-mortem* report written at the time of the macroscopic examination should be purely descriptive or objective. Pathological terms which may or may not be confirmed by subsequent more detailed examination are out of place. Such a report should be an intelligent description of what a person with a knowledge of anatomy actually observed, and not an attempt at premature interpretation.

Post-Mortem Findings

Since the opening of the new *Post-Mortem* Block at the College in November, 1937, an attempt has been made to have all animals which die or are destroyed in the College sent for *post-mortem* examination by the Pathological Department. There has been excellent co-operation and the clinics fill in a form giving

details of each case. During the period that this arrangement has been in force (*i.e.*, about 13½ months up to December 31st, 1938) 420 carcases have been examined.

Also during 1938 about 130 carcases were sent in to the Routine Department by veterinary surgeons and others for *post-mortem* examination—so that in round figures we do a total of about 500 *post-mortem* examinations per annum. The number of large animals in this total is very small and we regret very much that such a large proportion of our *post-mortem* cases are dogs and cats.

During the year 1938 the total of 509 *post-mortem* examinations was made up as shown in the annexed table.

Year 1938

	College Post-Mortem Examinations	*Routine Post-Mortem Examinations*	*Total*
Horses ...	8	—	8
Cattle ...	6	5	11
Sheep ...	3	14	17
Pigs ...	2	13	15
Goats ...	1	—	1
Monkey ...	1	—	1
Birds ...	4	19	23
Dogs ...	293	52	345
Cats ...	61	6	67
S. Fox ...	—	11	11
Mink ...	—	10	10
Totals ...	379	130	509

Amongst horses we have had several cases of tuberculosis—affecting thoracic organs, mesenteric lymphatic glands, spleen, etc. One case of a pedunculated lipoma arising from the mesentery and causing strangulation of the small intestine was of interest. There have been a few cases of colic due to impaction.

In cattle we have had one case of tuberculosis; one in which an enormous adenoma of the left kidney was found weighing *42 kg.*, compared with the normal right kidney, weighing less than 1 kg. There have been a few cases of *C. pyogenes* infection in cattle—one causing a pneumonia with miliary abscesses, and another with an abscess at the base of the cranium. An unusual case was that of an eight-months calf with a hair-ball in the abomasum. Parasitic pneumonia is a common finding in young sheep and pigs and various Salmonella infections in the latter species.

Among fowls we have examined a number of carcases condemned at the Smithfield Market, and confirmed the findings of tuberculosis by microscopic examination of smears, and also tabulated the occurrence and distribution of the lesions. Silver fox and mink carcases have also been submitted to us for *post-mortem* examination, and in these we have met with tuberculosis, anthrax (in a mink) and Salmonella infections.

It is dogs and cats of which we get by far the greatest number for *post-mortem* examination—over 400 cases in a year out of a total of 500 cases. Amongst these animals we find a very high proportion of neoplasms of one kind and another—actually 24 per cent. of the dogs and cats examined were suffering from neoplasms. Nearly a third of these neoplasm cases were epitheliomas (*i.e.*, malignant squamous-celled carcinomas). In the dog, the chief sites were the tonsil and skin. In most of the tonsil cases there were secondaries in the pharyngeal lymphatic glands and in two or three cases in the lungs. In the majority, however, the secondaries were in the pharyngeal lymphatic glands only. In the cat these neoplasms were found mainly in the oesophagus and tongue.

Mammary neoplasms in the bitch are also comparatively common—adenomas and adeno-carcinomas. An interesting case of the latter showed a primary carcinoma of mammary gland with secondaries in lungs and brain. Tumours of the liver are not uncommon in dogs—often the liver-cell adenoma. We have had a few cases of very large abdominal tumours in dogs—one associated with a ureter and forming a very large tumour mass with a cystic cavity in its centre causing compression on a ureter and hydro-nephrosis.

We also had a few cases of bone tumours, some of the osteo- or osteoid-sarcoma type and others of bone marrow (myeloid).

Nephritis is a very common finding in our dog *post-mortem* cases—about 10 per cent. of all cases. They fall roughly into the two main groups, chronic and acute, and eventually the dogs are destroyed suffering from uraemia. The acute cases may be very sudden in onset and are sometimes associated with haemorrhagic gastritis or gastro-enteritis, and buccal necrosis of the "Stuttgart" type and in a few cases with necrotic endocarditis. We have not been successful in isolating spirochaetes from any of these cases—so far.

The chronic cases may progress for long periods, eventually leading to sufficient kidney destruction to cause uraemia. Some degree of chronic kidney damage is common in old dogs quite apart from urinary symptoms.

Another common condition we find in dogs and cats, accounting for about 8 per cent. of cases, is what we—for the want of a better name—call *lymphadenosis*, a proliferation and infiltration of lymphoid cells often variously described as lymphosarcoma, pseudo-Hodgkin's disease, lymphoma, etc.

Tuberculosis accounts for about 5 to 6 per cent. of our dog cases. We have been keeping careful records, etc., of the cases in dogs during the past year or so and Dr. Lovell is typing a series of about 20 cases. So far as results can

be assessed up to the present the majority of the cases seem to be of the human type.

Tuberculosis in the cat sometimes takes the form of a cutaneous abscess. According to records feline tuberculosis infection is invariably of the bovine type.

Miscellaneous Cases.—We get quite a number of cases of old dogs suffering from heart lesions (*e.g.*, dilatation, hypertrophy, fibrous thickening of the free edges of the cusps of the mitral or tricuspid valves); various forms of liver degeneration (fatty livers, cirrhosis, chronic venous congestion); and enlargement of the prostate, causing constipation.

Of testicular tumours in dogs we get very few cases for *post-mortem* examination as the affected testicle is usually successfully removed surgically and sent in to the routine laboratory for diagnosis of the tumour.

From time to time we get a few accident cases which have died or been destroyed. In these, fracture of limbs is a common finding and in a number of cases rupture of the liver capsule with abdominal haemorrhage is found.

This is a brief review of the subject. I hope I have not intruded upon your time and patience for too long.

General Discussion

The general discussion was opened by Professor J. G. Wright who, however, expressed the wish that his observations should not be published.

Dr. J. McCunn remarked that as Professor Wright had ventured to be facetious he would follow suit. Mr. Withers had taken them to task about measurements, yet in describing an enlarged kidney in a horse he said it was as big as a bag of coal! (Laughter.) Was this bag ½-cwt., ¾-cwt. or 1-cwt. in size?

[Mr. Withers: I also reported the weight.]

Dr. McCunn then dealt with certain points raised in consideration of the medico-legal aspect (human *post-mortem* work, etc.), by Professor Wright earlier in the discussion.

Major H. Kirk, having expressed his appreciation of Mr. White's paper, which he described as most unusual and interesting, said that, apropos of Mr. Withers' observations on tumours in the dog, he had had for a long time—and he expected many other people had also—the impression that cancers of various kinds were very slow-growing tumours. In the last month, however, he had met with three most rapidly-growing ones. He was called to see a St. Bernard which was lame in a hind leg and had a large swelling in the region of the hock. The lady owner had been taking the animal to a quack, who said it was an abscess and had to be bathed with hot water. She had been doing so for two or three weeks. He (Major Kirk) expressed the opinion that it was a tumour and advised radiography, which advice she at first declined to follow. Later on she requested that a radiograph be taken and this proved the growth to be an osteosarcoma. That tumour, in six weeks, had grown to be as big as an orange; with well-marked erosion of the tibial bone.

Another more interesting case was in a Dalmatian which had a large tumour in the furrow of the neck. He removed every piece of it, as far as he could see—it weighed four pounds—and sent a portion to Mr. White, who reported on it. The lesion healed and the animal was going on beautifully, but in three weeks a secondary growth was discovered in the axilla, half the size of the original one.

He would like to ask Mr. White one question. In greyhound racing circles he was sometimes asked to send various liquids for examination: did he think it was a good procedure to vomit the dog by the use of washing soda, or should one use an injection of apomorphine? He had sometimes wondered if he was doing right in employing the former method, as it had occurred to him that it might interfere with the examination of the ingesta.

Mr. White replied that Dr. McCunn had conveyed to him the information that Dr. Clough had stated that, as far as chemical analysis was concerned, the giving of washing soda did not interfere in the least.

Dr. A. W. Stableforth said that Mr. White had emphasised the advantage of sending a full history of the case and he would like to stress that remark. It made matters very difficult when one got no history and no directions as to what was required, because there were often so many things that might be done with a given specimen. For example, in connection with a sample of milk, one was perhaps not told whether a culture or a microscopical examination was wanted and by the time one had asked and received a reply it was too late to do a cultural examination. In regard to tumours or other lesions, often a small piece of the lesion was sent in when a large one would be much more informative, and frequently no idea was given as to just how many lesions were present in the body, where only a representative lesion was submitted.

Reverting to milk samples, Mr. White had said it was usually best to take fore-milk; that statement ought, he suggested, to be qualified, because in the case of examination for tubercle bacilli it was generally regarded as preferable to take the strippings. Emphasis should also be put on the great importance of taking milk samples properly, by cleansing and disinfecting the udder, *e.g.*, with chloros or some other antiseptic agent, and sending the sample in quickly, because it was so unsatisfactory to find later that there were so many contaminating organisms in a sample that repeat samples were necessary.

The essayist, he thought, said it was best to send blood samples in 4 to 6 c.c. bottles, but he (Dr. Stableforth) felt that where possible, the use of the containers which were supplied by the laboratory concerned was to be preferred: their work could be much facilitated in that way.

In regard to swabs, or material such as pus, it was always well to take material from an unopened lesion whenever possible, because one thus got a much better picture of the actual cause.

Concerning the recording of the size of lesions, he had a definite preference for the likening of lesions to common objects where possible, and where, as was so often the case, absolute accuracy was not essential. The description of lesions in terms of common objects conveyed a much more graphic impression to others.

Major Glyn Lloyd, who had contributed previously to the discussion of the medico-criminological aspect, now referred to the

frequency with which, particularly in India or during a campaign, blood smears in large numbers had to be taken from camels or cattle and perhaps, in an outbreak of piroplasmosis, in dogs. It was very difficult and laborious to get blood by clipping and puncturing the ear or to extract blood from a vein. A method they adopted in camels was to puncture the dental pad with a scalpel. He was advised to do this by a laboratory worker who said that the saliva round the mucous membrane was reasonably sterile, and to his (the speaker's) mind, that appeared a more practical method of taking blood smears than clipping the hair, cleansing with æther or spirit and puncturing the ear. He would like to ask, therefore, whether Mr. White thought that this was a practical method of obtaining blood smears from a large number of animals.

Miss O. Uvarov desired to thank Mr. White and Mr. Withers for their papers, but she wondered if the former realised the difficulties of the average practitioner in obtaining all those quantities of specimens. It might be very easy to send pounds of liver or several pints of contents of the rumen, but from how many dogs could they get eight to ten ounces of urine? They considered themselves lucky if they could get two ounces, and with that amount they could conduct all their analyses, including the taking of specific gravity, and even have some left over for a microscopical examination.

She hoped the essayist did not underestimate the importance of urine alaysis as done by the average practitioner. Considering that one carried out frequent analyses of urine on a large proportion of cases seen during the day, the various reagents got used up very quickly, and their keeping qualities were not so unstable as to render them of no use to the average practitioner.

To the practitioner urine analysis was very useful indeed: more so than the collecting of several ounces of urine, sending it up to a laboratory, and waiting for a report which might come four or five days later.

She would like to ask Mr. White if he could state roughly, from his experience at the College, the proportion of dogs that either died or were destroyed from heart diseases?

Mr. C. W. Ottaway stated that he remembered seeing, when he was visiting a certain veterinary pathology institute in Germany, a number of common objects—such as millet seeds, walnuts, etc.—displayed round the walls of the *post-mortem* room; and when he asked why they were there, he was told that it was to enable students to become familiar with their appearance and so compare them with *post-mortem* lesions. He thought that it would be a good idea if this method was adopted in teaching institutes in this country.

A Member enquired if most of these lesions could not be measured by the use of calipers as employed for measuring tuberculin test reactions.

Dr. McCunn replied that the difficulty there would be that one was doing a *post-mortem* examination, and what would be the state of the piece of paper on which these details were to be recorded? It was an ideal method, however, if you had someone by you who could make a note of these measurements while the *post-mortem* examination was proceeding.

Mr. W. A. Pool observed that he would like to say how much he had enjoyed Mr. White's paper: he thought the essayist had dealt with the subject in a very practical manner and, in his view, it was one well worth bringing up at veterinary society meetings periodically.

With regard to the manner in which measurements should be given, he thought that it depended largely on the subject concerned. It was often sufficient to compare with a common object. Surely if one were told that a tumour was the size of an average orange that was often as much as one wanted to know. In many cases, accurate measurements were, of course, desirable.

Concerning the question of *post-mortem* changes, due to slow cooling of the carcase, an object lesson there was the case of the whale. Whale meat had some value, but there was difficulty in marketing it because putrefaction set in so rapidly on account of the buffering by adipose tissue even when the carcase was floating in an arctic sea.

The question of collecting data of *post-mortem* examinations was very important, because workers had to depend for much of their information on what others had recorded. That brought up the question of standardisation: when results were recorded systematically according to universally agreed methods they were more easily comprehensible to others and therefore more useful. He disagreed with Mr. Withers about working with bare hands. Veterinarians did run tremendous risks in the course of their work and many of them paid the penalty. It should not go out from any meeting that it was unnecessary to use gloves at *post-mortem* examinations. Certain very important and dangerous infections were not as likely to be encountered in this country as in some others, but there were still plenty of pathogenic organisms to protect oneself against in this work.

A Member enquired what was the optimum percentage of chloroform to add to milk, to preserve it.

Mr. H. E. Bywater said that he desired to thank Mr. White for his paper that evening, but he wished he had stressed more the importance of *post-mortem* technique from the practitioner's point of view. It was surprising how much the practitioner would learn by making his own *post-mortem* examinations, and in many instances it was not necessary to call in the aid of the laboratory.

He was afraid that some of the poorer members of the profession would think that making *post-mortem* examinations was rather an expensive hobby, when they listened to Mr. White's formidable list of the minimum of weapons required, as given by Mr. Withers, and might, in consequence, be deterred from doing any at all. But with regard to the larger animals it was not always convenient or desirable to allow the knackerman to make the *post-mortem* examination, and he would urge the practitioner personally to conduct as many as he could.

The "instruments" he regarded as necessary were as follows: First of all, a pair of gloves (if the veterinary surgeon was going to make the *post-mortem* examination, gloves were essential—as much for the sake of his patients as himself). Next he would mention a saw—just an ordinary carpenter's small saw or a tenon saw—which were quite suitable for sawing through bone—a slaughterman's knife, and perhaps a scalpel was quite useful. Have a bit of string to tie up the intestines or other parts, if one was going to send one's specimens on to a laboratory afterwards; also an old spatula or table knife, so that one could sear if necessary. One could get

all one needed for *post-mortem* diagnosis for about ten shillings.

Mr. Withers had said that he discovered a hair-ball in the abomasum of a calf and he seemed rather surprised. He (the speaker) was under the impression that the abomasum was not an uncommon site for a hair-ball; indeed, he believed that at one of the N.V.M.A. Congresses Mr. Oscar Stinson demonstrated an operation for the removal of hair-balls and masses of straw, etc., from the abomasum of the calf.

Mr. Withers here interpolated the observation that what he intended to say—if, indeed, he did not—in regard to the use of gloves was that in the case of the man in practice carrying out a *post-mortem* examination their use was even more important than in that of the laboratory man.

The President (Mr. N. S. King) said that before he asked Mr. White and Mr. Withers to respond, there were one or two things he would like to ask them. First he desired to know their technique in opening the thorax; *i.e.*, whether after opening the abdomen they cut down each side of the sternum and stripped it back: was that the ideal way?

In regard to the reference made by Mr. Withers to the use of gloves, personally he thought they were the most important part of one's *post-mortem* examination apparatus, being impelled to that view through personal experience, for he had good occasion to remember getting an infection himself, although that was acquired even through a pair of gloves, which were defective. He was making a *post-mortem* examination on a pig some years ago and was unfortunate enough to tear his glove on pieces of rib, with the result that he got infection through the pig, which was suffering from erysipelas: it was a very painful infection for a number of weeks.

Mention had been made also of the importance of adopting a definite, regular procedure. He thought that was very necessary, because otherwise one was apt to overlook things, whereas if one took things in a certain order every time one would find that it was not only much easier, but things found could be much more readily memorised.

In regard to the standards of measurement, he could not help thinking that the essential thing in establishing a measurement was that other people should be able to visualise the object. He found it extremely difficult to visualise a thing in centimetres and millimetres: he would rather say the size of an orange or of a millet seed.

In reference to nephritis in the dog, in the course of his *post-mortem* examinations had the essayist established the origin of the nephritis; *i.e.*, whether it was usually a pyelo-nephritis—the infection travelling up to the pelvis of the kidney—or whether the majority of these cases were infectious in origin: in other words, an ascending or descending infection?

The Replies

The President expressed the hope that both Mr. White and Mr. Withers would reply to the points raised in the discussion respectively addressed to them.

Mr. White, dealing first with Professor Wright's comment that the pathologists at the Royal Veterinary College were very honest in admitting that they did not know the cause of death in many cases, said that they did know it—it was nembutal followed by HCN—(laughter)—but unfortunately they did in some cases not know the cause for which the animal was destroyed.

With regard to the criticism of his remarks on testing urine for sugar, he quite agreed that in testing with Fehling's solution if one got a brick-red precipitate of cuprous oxide, that suggested the presence of sugar—but he stressed that Fehling's was not specific for its presence. They should remove albumin before testing for sugar. If they boiled dog's urine with Fehling's they would always get a greenish coloration and would find themselves putting down "sugar, a trace" unless they were careful.

In reference to Dr. Stableforth's remarks in regard to the sending in of milk samples, he (Mr. White) had said that it was a good practice to discard the first few drops of milk and then take the sample; of course, as Dr. Stableforth had stated, in tuberculosis it was more important to take the strippings than the fore milk.

If a farm animal died and the farmer lived near the laboratory it was a good thing to persuade him to bring the animal up, because by that means one could get very valuable information before one started one's *post-mortem* examination: information much more valuable and obtained more quickly than could be secured through correspondence.

In the matter of sending blood to the laboratory, he was not speaking of blood samples to be dealt with by routine examination; he was thinking of the practitioner who only very occasionally sent in a blood sample, whom he suggested should take 5 to 10 c.c. in a small sterile bottle or tube.

Many speakers had dealt with the question of measurement by comparison with common objects. As he saw it, if a lesion could be conveniently described with regard to its size and shape by a common object, he could discern no disadvantage in using that type of description: if the lesion was the size of a pin-head he could see no disadvantage in using that; it was a much quicker form of description and it conveyed more. On the other hand, they met with many lesions which could not be described in that way. In such cases he made a diagram of the specimen—say, a tumour—and gave a few dimensional measurements in relation to the drawing. A diagram was most useful. He thought that in all scientific work one should employ the metric system of measurement.

Major Glyn Lloyd's remarks as to the method of taking blood samples were most interesting. He (Mr. White) thought that, in regard to dogs, it was useful that they should be taken in a syringe, which should be boiled and allowed to dry or which had been kept in alcohol. Take, say, 1 c.c. of blood from the saphena vein, quickly detach the needle, and expel a very small drop on each of three or four clean slides and rapidly make your smears. If you were dealing with the large animals, however, he thought it was an excellent idea to make a small incision in the pad of the lips with a scalpel, so long as excessive friction was not used, as otherwise a leucocytosis might be produced.

Miss Uvarov had remarked on the small amount of urine one could obtain from the dog. He gave the amount of six ounces because he thought it was better to give the optimal amount rather than the absolute minimum. If one could get six ounces one should, of course, do so, and in any case they should secure as much as possible. An analysis could, of course, be carried on much smaller samples.

There was everything to be said for the practitioner doing his own urine analysis, but unless he was going to do it fairly frequently he was, perhaps, not as well qualified to carry out urine analysis as were the people in the laboratory.

With regard to heart failure, that question of Miss Uvarov's was a very difficult one to answer because, whatever the exciting cause might have been, the actual cause of death in most cases was, as he had said, nembutal and HCN. However, they did not find a very high incidence of heart disease in either the dog or the cat and, as they had heard from Mr. Withers, they did not get many large animals for *post-mortem* examination.

Mr. Ottaway had mentioned the placing of common objects in bottles in the *post-mortem* room. That was done in the Veterinary Institute at Leipzig, and he thought it was a very good idea, but some lesions were not of a suitable shape, apart from size, to be compared with common objects. Calipers were quite useful, in human *post-mortem* work, for estimating the cranial capacity, etc., but they found that the ordinary celluloid or metal ruler was quite as serviceable for their work.

He was very interested to hear from Mr. Pool about the deterioration in the keeping qualities of whale meat due to the buffering by adipose tissue bringing about putrefaction.

He thought he had answered his remarks about common objects. As Mr. Pool had said, in regard to recording of findings, if one was going to write up a case, one should give accurate measurements and some sort of a diagram, because if one was going to publish work it was going to be quite useless if people who were reading it could not understand your description. Concerning bacterial multiplication in urine samples, just a few drops of toluol were enough to inhibit that.

In reply to Mr. Bywater, he would say that the practitioner did require a minimal number of instruments for *post-mortem* work. As Mr. Withers had said, a knife with a six-inch blade was the most useful article at the *post-mortem* examination of large animals, but he thought it would be rather difficult to open a dog's intestines with a slaughterman's knife. [Mr. Bywater: "I said for pigs and the larger animals."] As regards the saw, there was no need to have a backless saw—the ordinary butcher's saw would do.

Concerning hair-balls in the abomasum, he was afraid they had not had much experience of hair-balls in ruminants; they had had three cases in young calves, in which the hair-balls had all been in the rumen.

Gloves with a small hole were nothing less than a death-trap at *post-mortem* examinations. Like the President, he contracted erysipelas, but not through wearing defective gloves—he had omitted to wear any. Strangely enough, he got his infection from a peacock. The main point was to test if the gloves leaked. Before putting them on sprinkle a little French chalk on the gloves, hands, or both. As long as they did that and after washing them in cold or warm water dried them well, the ordinary household rubber glove would last quite a long time.

In reference to opening the thorax, the position in animals was more difficult for them than in the case of man, because in man the thorax was flattened antero-posteriorly and when the sternum and costal cartilages were removed a wide opening was created; in animals it was advisable to remove a fair portion of the ribs. You started your incision in the abdomen just behind the xiphoid cartilage of the sternum, where you were less likely to puncture the intestines. When the peritoneal cavity had been opened one proceeded to open the thoracic before removing the abdominal organs.

With regard to *post-mortem* technique in animals, however, veterinarians were very fortunate as compared with their confrères in human surgery, because they had seldom to take account of the cosmetic factor: in the human subject the incisions had to be very carefully made with due regard to the appearance of the body after the autopsy. In animals, in most of which they had facilities for carrying through a complete *post-mortem*, he really did not see why they should not proceed in a proper way and always remove the cervical organs which, in the smaller animals, should be examined while still attached to the heart and lungs.

Concerning the diagnosis of tuberculosis, they had found that it was not always so easy as they might think; for example, the common type of tuberculous mastitis was very difficult to diagnose on macroscopic examination. They found that their quickest way to diagnose tuberculosis was often the examination of frozen sections, especially in the dog. Then, again, tuberculous lesions in the spleen in the horse closely resembled sarcomata, and were commonly diagnosed by the practitioner as such; but it was easy by making a frozen section to diagnose tuberculosis of the spleen in the horse. In the dog one did not get much caseation; nor did one get calcification or the presence of giant cells—but one did get tuberculosis. In some cases tubercle bacilli were very scanty and in the majority of the 20 cases from which Dr. Lovell was typing the tubercle bacilli, he and Dr. Lovell had experienced considerable difficulty in finding the organisms in smears. Often only one or two bacilli were found after examining several smears. The usual procedure was to examine a frozen section on the day after the autopsy when tuberculosis was very readily diagnosed and suitable material which had been retained in the refrigerator was used for bacteriological examination. He wished to stress the peculiar lesions seen in the dog and in the fur-bearing animals in tuberculosis—the lesions, like those in the horse, were quite different both macroscopically and histologically from those which they regarded as "typical" in bovine tuberculosis.

[Mr. White thanked the audience for the way in which they had received the paper and in particular those who had taken part in the discussion.]

Mr. F. W. Withers also replied, briefly. Speaking in reference to the President's question concerning nephritis in dogs, he said that about half their cases seemed to be of the acute type and the gross appearance of the kidney was fairly characteristic. They had made some attempt to isolate spirochaetes from these cases, but had not succeeded.

With regard to the type of infection, he thought probably some toxic agent was responsible and that spread was by the blood stream. They had not found any pelvic lesions in the acute cases. That was rather borne out by the fact that in a few of their cases they had an associated necrotic endocarditis, which presumably would be due to the same toxic agent, the heart lesions being secondary.

A Living Tubal Ovum of the Horse*

E. C. AMOROSO and W. B. GRIFFITHS
(Department of Embryology and Histology)
Royal Veterinary College, London

W. J. HAMILTON
Anatomy Department, St. Bartholomew's Hospital Medical College, London

Living tubal ova of a wide variety of our domestic mammals have been successfully studied by a number of different workers.[1,2,3,4,6,7] Up to the present time, however, the living tubal ovum of the horse has not, as far as we know, been the subject of direct observation. Hartman,[5] in his review on "How Large is the Mammalian Egg?" in estimating the true average size of the living horse egg relied on measurements of ova in prepared sections of fixed ovaries. A tubal ovum was recovered in the Department of Embryology of the Royal Veterinary College, London, on December 3rd, 1938, in the course of routine examination of equine tubes and uteri. In the present paper we wish to present an account of this naturally shed ovum as the first contribution to our knowledge of this stage of development in the *Equidae*. We have been informed, however, in a personal communication from Mr. F. T. Day, of Cambridge, that two days prior to the date when we recovered our egg, he succeeded in obtaining a tubal ovum from a mare which had been induced to ovulate by artificial means. We understand that an account of his ovum is being prepared for publication.

The Fallopian tube from which the ovum was recovered was washed out with isotonic salt solution about two hours after the mare had been destroyed. On recovering the ovum it was immediately photographed at a magnification of 95 diameters; while fresh and still in the salt solution (Fig. 1) and in water (Fig. 2) after fixation in Zenker formol to which a trace of glacial acetic acid had been added. After embedding in paraffin, serial sections 5μ in thickness were prepared.

The photograph reproduced as Fig. 1 shows the appearance in isotonic salt solution of the living egg. As seen from the photograph, the zona pellucida enclosing the egg proper is relatively thick, homogeneous and devoid of cumulus cells. The vitellus appears opaque with a roughened irregular outline and, as is usual with tubal ova, does not completely fill the zonal cavity. The perivitelline space is not homogeneous but shows a peripheral accumulation of granular material.

The measurements of the intact egg in isotonic salt solution and after fixation as taken from the photographs (Figs. 1 and 2), are included in the Table below.

In comparison with our measurements of the living egg, Hartman's estimate of 135 microns offers a remarkably close parallel, this, in spite of the fact that his evaluation was based on sections of fixed ovarian eggs.

Figure 3 is a photo-micrograph of the sectional series through the equatorial plane of the ovum. The most conspicuous feature of the ovum in this state as compared with the intact living egg, is the evident shrinkage of the cytoplasm and the partial collapse of the zona pellucida. Histologically the cytoplasm shows evident signs of degeneration, a condition which has led us to believe that the ovum had remained in the tube for some time after ovulation. Polar bodies could not be recognised in the living specimen or in the sectioned material. The nucleus shows signs of disintegration as is evidenced by the collapse of the nuclear membrane.

We wish to record our indebtedness to our technician, Mr. J. Hancock, for the photographs illustrating this paper, and Mr. H. Burgess for his invaluable assistance during the course of this work.

Measurements.

Condition of Egg.	Outside Diameter of Zona in Microns.	Inside Diameter of Zona in Microns.	Thickness of Zona in Microns.	Volume in Cu. Microns.
Before fixation ...	160 × 156	133 × 130	13·2	1,209,714
After fixation ...	123·3 × 113·3	113·3 × 106	4·3	694,579

Volume shrinkage of fixed egg as compared with fresh egg, 52·3 per cent.

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LIVING TUBAL OVUM OF THE HORSE

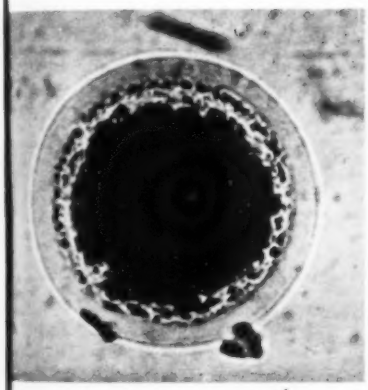

FIG. 1
Photomicrograph of the living tubal ovum of the horse, photographed in isotonic saline. x c. 285.

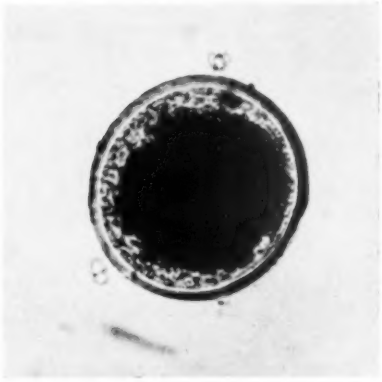

FIG. 2
Photomicrograph of the same ovum as in Fig. 1, after fixation by Zenker-Formol-Acetic. x c. 285.

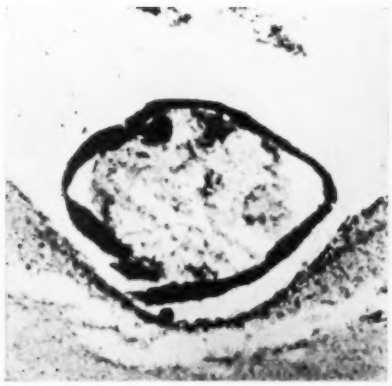

FIG. 3
Photomicrograph of the equatorial section of the tubal ovum stained with H.I.H. x c. 500.

SOME HUMOROUS INCIDENTS AT THE "NATIONAL" MEETING IN DUBLIN IN 1900

F. L. GOOCH, F.R.C.V.S.,
STAMFORD, LINCS.

Through the kindness of the Royal Dublin Society, our meetings were held in their spacious rooms. The President (Lord Ardilaun) invited the delegates to lunch with him on the Tuesday. On arriving in the morning we found that ladies were expected, so some of us had to leave the meeting and scour Dublin to find our wives and lady friends; we were fairly successful and returned in time to partake of a very enjoyable lunch. On Wednesday the Irish members had arranged an excursion to Glendalock in County Wicklow. A special first-class train started from Kingston, calling at Dublin, and then non-stop to Rathdrum. We received two tickets each, but one delegate had his two sisters with him and wanted to pay for the third ticket; however, Colonel Steel, who was a very energetic M.C., said only two tickets could be had. How it finished I did not stay to see, as we were asked to take our seats in the train as quickly as possible. Arriving at Rathdrum, we were met with "jaunting" cars and one or two wagonettes for the convenience of those ladies who were nervous of the former.

We started on a delightful 18-mile drive, passing through the "Devil's Dyke," where the incline was so steep that most of us dismounted and walked through the "Dyke." Just before entering Glendalock and passing down a steep hill, the horse in the car in front of us fell and pitched out the driver who, in falling, broke his collar bone. Riding in that car were Mr. and Mrs. Dawes and Mr. and Mrs. Blakeway. We accommodated two of them on our car and two on the next, and we safely arrived at our destination, when we were all quite ready to partake of a delightful lunch that was provided for us. During the lunch the President arranged for a collection to be taken on behalf of the driver who had met with the accident, and £4 17s. 6d. was collected. When the President handed the money to the driver he was so surprised that in his broadest Irish he exclaimed: "Aw, sure you know, I would have the other one broke for the same amount." After lunch we had a photograph with one of the "round towers of Ireland" as a background, and a very pretty picture it is, bringing back many memories of happy associations. We were then told we could "go as we pleased" until tea; some went boating on the lake and others walking. I was at that time with Professor Cossor Ewart, who wanted to secure a real plant of shamrock, so enquiring of the boatman, we were informed that if we walked to the head of the lake we should find plenty. We started off and, arriving at the head of the lake we found a large patch of what we thought was shamrock, and each securing a large portion we tramped back, but when the boatman saw what we had he soon exposed our botanic ignorance by informing us we had oxalis and not shamrock. Imagine our disgust after walking till tea-time! After tea we started to drive 13 miles to Rathnew, where we found our special train awaiting us. On arriving back at Dublin we were given two tickets for the theatre where some noted actress was taking part. I did not go to the theatre as I wanted to see more of Dublin, so we engaged a car and told the driver to take us to some noted places in Dublin, including Phoenix Park, and we arrived back at the hotel just before dark.

When leaving our hotels at Dublin we were informed that if we stayed for the Dublin Horse Show they could not let us any rooms, but would secure rooms outside and we could take our meals at the hotel.

In connection with the Congress an extended excursion had been arranged to visit Killarney, so on the Thursday morning we left Dublin by special train and as we were informed we should should not arrive at Killarney till 5.30, most of us ordered luncheon baskets to be put on the train at our only stop, *viz*., Mallow Junction, where we could stay only five minutes as an express was following us. The baskets were, therefore, put on the train in a great hurry and very few obtained a basket with the drink they had ordered: anyone ordering a Bass or a Guinness found themselves with a claret or a ginger beer, so there was much changing over of baskets. Arriving at Killarney, most of the officials stayed at the Great Southern terminus hotel, others of us had to take charabancs to the "Lake View" or the "Lake Victoria" Hotels. I was sent to the Lake View, where we found that delegates accompanied by their wives had nice front rooms overlooking the lake, but the bachelors were not so fortunate as they found two were expected to share one room. Some naturally objected, and returned to the Great Southern where they found accommodation, but before the week was ended some of them wished they had stayed at the Lake View, as there was an outbreak of ptomaine poisoning and some of them were so bad that a doctor was fetched at 2 a.m. on Sunday morning.

Early on the Friday morning Mr. Bond, of Plymouth, and myself went for a walk towards Muckross Abbey and, returning through a field where they were busy making hay, one of the workers made a "hay band" and placed it on Mr. Bond's leg, also one on mine, and tied us together, stating that it was the custom of the country that when strangers came to the fields they were tied until they paid their "footing." After we had eased our pockets of a shilling, we

were liberated and tools placed in our hands to help with the hay. Leaving the field, we passed through the farmyard and had our first view of the inside of an Irish crofter's house. The room we entered was a big square apartment divided into two triangles. On the right was the lady of the house, busy with her work, with that part scrupulously clean; in the other triangle were the cow and some geese standing on manure about an inch thick. Outside were goats, tethered together, and when we asked why they were tethered the lady said it was to keep them out of the cabbage patch, just in the front; on our saying it would have been better to fence the cabbage patch she replied, "It is cheaper to tether the goats than to fence the cabbage patch." We also saw the flax being soaked in a dyke ready for bruising and making into linen, but we found all the seeds in the flax, and asked why they did not thresh the flax and obtain the seed for feeding purposes. The reply was that "Father did it this way and we still do the same," all this showing the primitive state of agriculture in Western Ireland at that time.

On Friday morning we all went on the No. 1 trip to the Gap of Dunloe, and on arriving at Kate Kearney's cottage we had to dismount and either walk or ride a pony to the head of the lake. Some took a pony and others decided to walk. I secured a pony for my wife, and the boy in charge asked if the lady would be all right if he showed us a "near cut" to the lake; as we climbed up the hill we passed some illicit "stills" and were invited to partake of a drop of the "cratur," but none of us succumbed to the temptation. The charge for the pony was 1s., but among those who decided to walk was Mr. Hunting, the Secretary. He found they were Irish miles and when he had travelled some distance he decided to have a pony, but found that the charge was now 3s. or 4s., and whereas he could have travelled all the distance for 1s. he had to pay 4s. to finish the journey. On arriving at the head of the lake we were taken about six in each boat and were asked to be very still when passing down the rapids as the water was rather rough and dangerous and we should ship some. In our boat was Mr. W. South, who had on a heavy white mackintosh, with large pockets, in which were several letters asking him to examine some horses at the Dublin show; without his knowing it some water filled his right-hand pocket and when he wanted to sit down for lunch on landing he found all his letters almost reduced to pulp and the writing not decipherable. We found lunch awaiting us when we left the boats and after thoroughly enjoying it we took our seats in the charabancs awaiting us and returned to our separate hotels after a very enjoyable trip.

On the Saturday we took No. 2 excursion, the route being to Muckross Abbey, the island of Innisfallen and the road by the sea through the natural rock arch to Connemara. Whilst at the island of Innisfallen we remarked on the beautiful green of the grass and we could quite understand Ireland being called the Emerald Isle. We also very much admired the fuschias and hydrangeas which grew nearly as high as the lodge roof. In conversation with the shepherd he related a humorous story: A farmer who rented the island sent some lambs down and did not see them for some time. When he did come he asked the shepherd where his lambs were and the shepherd replied that those in the field were his lambs. He said, "I sent lambs, those are 'shearlings,'" and could scarcely believe that they were his lambs.

On Sunday there was no service at the Protestant church so those staying at the Lake View Hotel were invited to visit a Monastery school at the back of the hotel. After being shown round by the Lady Superior, we were saying good-bye when Mr. Moore, of Scarborough, asked why no nuns were at the school, and when told they were all nuns he said he had never before seen such a pretty girl a nun, which made the Lady Superior blush, and we all laughed.

On Sunday evening we arranged to attend the Roman Catholic Cathedral and decided to walk, when we saw most of the people going, some in donkey carts, jaunting cars, and all kinds of vehicles, there being a continuous stream all the way to the Cathedral. We could not understand much of the service, but the preacher gave us a good sermon from the text "Many of you have desired to see the things we see and have not seen them, and to hear the things we hear and have not heard them."

On returning to our hotel, Mr. Moore, who was the life of the party, entertained us on the piano and we had singing and playing until bed-time.

We left Killarney on Monday morning for Dublin, and as several of us decided to spend a day or two at the Dublin Show we went to the room provided for us by the hotel manager and there found letters awaiting us from the President, making us members of the Royal Dublin Society for the Show, the wearing of our "National" badge to admit us to the showground and stands. Several of us availed ourselves of this privilege and stayed for two or three days and then returned to our various homes, having participated in one of the most enjoyable Congresses it has been my privilege to attend.

Ned, an eight-year-old collie, has shown an example of the homing instinct by travelling over 70 miles alone to his old home. He is owned by Mr. James Paul, who gave up the tenancy of Walton, Bo'ness, at November to take over a farm in the Kelso district. Ned never settled in his new quarters and one day last week set off for Bo'ness on his own, arriving at Walton two days later.—*Scottish Farmer.*

CLINICAL COMMUNICATION

One "Twin" a Monstrosity

J. M. BUCHANAN, M.R.C.V.S.,
GLASGOW

Monstrosities are occasionally met with in practice and their successful delivery calls for much patience and ingenuity on the part of the surgeon. The case I shall endeavour to describe is interesting and possibly unique as regards the position and appearance of the calf.

On December 31st last, while managing the Bletchley practice of Mr. How, M.R.C.V.S., Newport Pagnell, Bucks, I received a summons by telephone to attend a cow at parturition.

The subject was a Red Poll cow at the fourth calving. On examination eight legs were found in the passage, probably due to the efforts of the owner to accomplish delivery, and twins were diagnosed. After several attempts one calf was repelled, the fore-feet of othe other roped in the usual way and gentle traction applied. On re-examining, a head was felt just below the pelvic brim, and when an endeavour was made to pass a rope over, another nostril and eye was felt joined to it. At first it was thought the twins themselves were united as the other calf persisted in entering the vagina when traction was applied. Eventually a hook was inserted into the right orbit furthest away, in an endeavour to slew the head into the passage, the maternal pelvis fortunately being roomy. With traction the orbit and part of the facial bone was delivered. This, however, had brought the head sufficiently up for a rope to be put on the neck. The other calf again having made its presence felt, it was repelled and the pulleys were then fixed on. After severe exertion our efforts were crowned with success and the calf was delivered. A few minutes later the other joined it: both calves were dead.

On examining the first calf two distinct nostrils were found, one set of eyes was complete, the opposite being broken beyond recognition by the hook. One pair of ears was common to both with a tail appendage about twelve inches long between. At the rectum the tail was found as usual. This calf, I may add, was a bull. To all appearances the other calf was normal and a heifer.

So far as I am aware the cow made an uneventful recovery. When seen 24 hours after she was stiff, but had cleansed herself and there was no apparent swelling at the vulva.

ANNOTATION

The Place of Pathology among the Medical Sciences

The above was the subject of the first lecture in memory of the late Professor E. H. Kettle, given at the London School of Hygiene and Tropical Medicine, on November 24th, 1938, by Professor W. W. C. Topley.

The contributions of Kettle to pathology were particularly notable for the patience and determination of his experimental work, his insistence on securing sufficient evidence before drawing conclusions, and the general breadth of his outlook.

Professor Topley pleaded for a realisation of the interdependence of the different branches of pathology—pathological anatomy, bacteriology and pathological chemistry. "If there is any danger at the present time in regard to the relative activity of the different aspects of pathology, it is a danger of too few morbid anatomists, not too many. This shortage appears to be due in part to the counter-attraction of the experimental field and in part to the lack of opportunities for advanced study. There is no course in pathological anatomy corresponding to that of the diploma in bacteriology."

A pathologist must have some knowledge of structural tissue change, but he must also know enough physiology to relate abnormal structure to abnormal function, enough biochemistry to understand something of the chemical causes, or consequences, of the pathological processes that he studies, and enough bacteriology and immunity to give him some insight into the mechanisms concerned in infective disease. The common use of the label "pathology" as synonymous with morbid anatomy is misleading. Again, the bacteriologist, properly so called, is clearly a particular kind of botanist: he studies bacteria as such. The medical bacteriologist, on the other hand, is a pathologist who is concerned with the bacterial and virus infections of man and animals. He must spend much of his time and energy in studying the parasites; but he cannot neglect the hosts. It would be difficult to find a better example of the close and inevitable relationship between morbid anatomy and medical bacteriology than Kettle's work in the years following the Great War.

A considerable part of the pathologist's work had to do with the observation of naturally occurring events not under experimental control. He has, therefore, to guard against drawing premature conclus'ons from inadequate data and rapid solutions to his problems are unlikely. Recent advances in physiology have

been to a large extent achieved by the successful designing and exploitation of "acute" experiments: pathologists are largely concerned with experiments that are as "chronic" as the processes which they are designed to study.

The present medical curriculum, stated Professor Topley, is frankly a system of almost disconnected examinational hedges. The concept of disease processes should be introduced much earlier into education and should be continued much later into the curriculum. This would mean scrapping some things which were now taught, but he would willingly let them go. If the student knew well those parts of anatomy, physiology and pathology that had a direct bearing on his clinical work—if he knew them so well that he could grasp their significance and discuss them intelligently—he would be a better scientist and a better clinician than if his heritage from his pre-clinical studies was a vague recollection of a partially digested mass of unappreciated facts and theories.

"In most medical schools, pathology is an 'ancillary' subject in the clinical years, not over-kindly treated in the matter of available time and competing for the student's attention with the new human interest and obvious practicality of clinical work. It is too apt to be regarded as a matter of merely learning to identify things, whether under microscopes or in bottles, or to perform tests which are useful in diagnosis. Let there be no mistake about the claims of the pathologist for his subject. It is not ancillary to medicine but the foundation of it. The learning of pathology is not a mere academic exercise and an extension of facilities for diagnosis; it is a fundamental necessity for comprehending the processes of disease, and hence for intelligent and progressive treatment and prevention."*

In Professor Topley's opinion, the introduction of pathology as a tripos subject at Cambridge will be regarded by the historian of medical education in this country as a turning point: partly because there are certain aspects of general pathology which are best taught at this stage of a student's career and also because the introduction of pathology of the right kind will enhance the student's interest in his physiological and histological studies, and will make clear to him, while he is pursuing them, their bearing on disease processes.

The significance of Professor Topley's remarks and their bearing on veterinary pathology in its relationship both to clinical veterinary medicine and to veterinary education would seem to warrant a careful study of his lecture and a consideration of its implications, especially in view of those recommendations of the Report on Veterinary Education which deal with the teaching of pathology.

E. G. White.

*B.M.J. leading article.

The Veterinary Record

February 11th, 1939.

The Colonial Veterinary Service

THE annual reports of the several departments of the Colonial Veterinary Service are reviewed regularly in the pages of this journal and comparison of the results achieved from year to year shows that remarkable progress is being made despite the difficulties under which the Service is at present working. This progress is a striking indication of the contribution that veterinary science can make to the welfare of all countries. Whether it is a small territory dealt with by one, two or three veterinary officers, such as Trinidad, Ceylon, Fiji, Somaliland, Cyprus, British Guiana, Jamaica, Hong Kong or Mauritius, or whether it is one with a larger and more complex veterinary organisation, such as Kenya, Nigeria, Tanganyika, Uganda, the Gold Coast, Malaya, Northern Rhodesia, Palestine or Nyasaland, we see the same evidence of success. Each has faced emergencies and dealt with them successfully, and acquired credit in the process.

The reports of these departments are Empire history, and the extent to which animal disease has played an important rôle in history is often overlooked. Glanders and mange have affected the fate of big armies. Rinderpest, East Coast fever, African horse sickness and the tsetse fly have been, and are, major factors in Africa.

A great lesson of colonial veterinary service is that men can be found who are capable of adapting themselves to the local conditions whatever they may be, with the result that they become authorities of great value to the territories they serve. This is made evident in the administration reports that are issued. Although these men have had a common basic professional training the policies of their departments show great diversity of outlook and, consequently, of the policy followed. The policy is conditioned to some extent by the stage reached in the development of the department; for example, it may be necessary to control one or more of the existent enzoötic diseases before intensive development of the general disease situation is possible. More often the policy is influenced by the nature of the local environmental conditions—rainfall, water

supplies, seasonal fodder shortage, native customs relating to stock-keeping and so on.

It is clear that the men responsible do not follow narrow, well-worn channels in the development of their work, but rather show ample capacity to learn from their experiences and fearlessly explore and open up new approaches to the difficult country ahead of them.

In Kenya there are zones of European settlement and native reserves, both with widely different problems. Rinderpest and other major diseases are controlled over large areas in the one and still troublesome in the other. With the intensive farming done under European enterprise a wider range of disease conditions is investigated and dealt with than is possible at the present stage with the more primitive conditions that exist in the native areas.

In Tanganyika major problems are food and water supplies and these are acute because of the very large area of the Territory which is infested with the tsetse fly, with the consequence that the indigenous population is tempted to overstock areas that are free from the fly. All this is reflected in the activities of the department, studies of fodder problems being given great prominence. In Kenya the possibility of developing the export trade is being actively investigated. Similarly, in other territories each has its special developments; in the Gold Coast rinderpest and cattle breeding are major interests.

A decade hence will see considerable reorientation of existent policies. Rinderpest will almost certainly have receded from the limelight in many countries, except where it is liable to be introduced from outside territory in which control is unsatisfactory. Contagious bovine pleuro-pneumonia may have been eradicated from some areas. The fodder problem will still be to the fore and the tsetse fly will almost undoubtedly be no less prominent.

One effect of an efficient veterinary department is the unmasking of diseases hitherto unsuspected, *e.g.*, Rift Valley fever in Kenya. The existence of an unsuspected disease hinders efforts to improve the general animal health and its discovery strengthens the position in the territory concerned.

The history of disease incidence would suggest that the colonial territories will be fortunate if no new and hitherto unsuspected dangers occur in the future. Equine encephalomyelitis and avian laryngo-tracheitis in the United States of America are examples of unexpected visitations that had to be countered in recent years and have caused great loss. Therefore, the colonial governments have reason to appreciate the value of their veterinary departments and will be well advised to ensure that their development is maintained.

The last decade has been a period of considerable development. After the lag due to the War and the difficulties of the post-War years the effects of the pioneering work are beginning to be apparent. The control of rinderpest is now real in many important territories and veterinarians are beginning to look forward even to its eradication from some countries in which it had been accepted as an inevitable and ever-present plague. Contagious bovine pleuro-pneumonia is under active study both in the laboratory and in the field and there is reason to hope that, before long, it may be eradicated from certain areas. Many examples of this progress might be given, but it is unnecessary to multiply them.

The success of veterinary work in Africa has even been blamed for the soil erosion that is such a serious problem. An important article on the subject in *The Times* actually spoke of veterinary science as an outstanding contributory factor in this respect as with the control of fatal disease the livestock population could increase and through overstocking damage the vegetation and contribute to the vicious cycle that results in soil erosion. It is unnecessary to point out that veterinary science can and must play a rôle in dealing with this difficult problem. Many factors are concerned and the other services, both scientific and administrative, must share the responsibility.

Hornby's remarks on soil erosion in his last annual report are interesting: "One cannot adequately deal with the subject of stock numbers in Tanganyika without referring to another popular idea; the one that tsetse are the saviour of much of the country from soil erosion; an idea that is based on the entirely gratuitous assumption that if there were no tsetse then stock would be in excessive numbers elsewhere. I think a less debatable view is that tsetse are the main cause of soil erosion on the fly-free areas. I hold that had there been no pressure from fly, the present high concentrations of men and their stock would not have occurred; the grazing available would have been ample for all the stock demanded by all the people. Further, in the absence of tsetse, stock rearing would be comparatively easy (as in India) and the possession of stock would

confer little honour, so there would be less incentive to their accumulation."

This is not the place to discuss all the complexities of colonial veterinary work. The examples chosen show that much is being done and the success achieved should provide justification for the support given by the different governments; in many cases much more support—and that means financial support—is required. May we hope that those in administrative positions realise the sterling worth of their veterinary staffs and see that full use is made of the contribution that can be expected from veterinary science.

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The New Minister of Agriculture

AS we mentioned in last week's issue of this journal, the veterinary profession will look forward with confidence to a continuance of the goodwill which exists between the profession and the Ministry; indeed we may reasonably hope that the goodwill may be intensified.

As a profession we cannot but be delighted at the prospect of having as Minister of Agriculture a man who will be in a position to advise, as well as being advised by, the permanent officials at the Ministry. The problems of agriculture are the problems of the veterinary profession and it is certain that the new Minister will appreciate the efforts which we are making towards the solution of our mutual problems and will give especially sympathetic consideration to any suggestions which we make towards that end.

Sir Reginald Dorman-Smith has a great reputation as an enthusiastic and indefatigable worker in the interests of agriculture. He was elected President of the National Farmers' Union in 1936 and holds the unique record of being the only man to occupy the office for two successive years. He was selected to lead the representatives for the United Kingdom at the Empire Producers' Conference in Australia and won great praise for the part he played in the success of this conference.

Sir Reginald was elected Member for Petersfield division of Hampshire in 1935 and was knighted in the Coronation Honours List in 1937.

An Irishman with a charming personality and gifted with a rare sense of humour, we shall look forward to an early meeting with him.

ABSTRACTS

[The Relation Between Parasitic Diseases of Man and Animals. I.—Hall, M. C.; II.—Kral, F. (1938.) Thirteenth Int. Vet. Cong.]

The late Dr. Hall deals with this subject from a general point of view and states that mankind will become infected with the parasites of all other animals, or other animals with those of man, whenever adequately exposed to these parasites unless an inherent immunity of some sort is present. The study of the former factor falls within the fields of epidemiology and epizootology and the latter within the field of immunology.

Factors of epidemiological significance favouring the infection of man with parasites of animals include ignorance of facts in some field of parasitology on the part of the public, the individual or science; a low social economic status correlated with a low sanitary standard; inadequate disposal of faeces; inadequate provision of a safe water supply, and inadequate clothing, cooking, etc. Such conditions occur most frequently in the tropics, in rural areas and among children.

In brief, man and animals will share the same parasites whenever exposed to them unless an immunity of some sort prevents this.

In the second paper the writer deals more specifically with the actual parasites affecting man and animals. Not only are helminth parasites considered but also protozoa, fungi and ecto-parasites.

Among the Protozoa the most important considered are Entamoeba, Trypanosoma and Leishmania; among the Fungi are Trichophyton, Favus, Actinomyces and Aspergillus.

Among the Trematode helminths Fasciola, Paragonimus, Opisthorchis and Schistosomum are the most important, and among Cestodes Dibothriocephalus, Dipylidium, Hymenolepis and Taenia may infect man in their adult stages and *T. echinococcus* with its larval form as hydatid cysts.

Among the Nematode helminths common to man and animals which are discussed are Filaria, Trichinella, Ankylostomum and Ascaris spp. as well as numerous parasites of animals less frequently found in man.

Among the ecto-parasites many are only temporary parasites but some, such as Sarcoptes, Oemodex, Pediculus, Mallophaga and Linguatula, are more permanent parasites.

J. S. S.

[**Control of Salmonellosis in Animals.** Manninger, R., Verge, J., Miessner, H., Fujimura, S. (1938.) Thirteenth Int. Vet. Cong.]

Broadly there are two methods which may be employed in dealing with Salmonella infections in animals. One method consists in attacking the sources of infection, and this implies some knowledge of the normal habitat of the different species in the Salmonella group. There is a considerable amount of information on this point and it has been made available because of the extensive work on the serological aspects of the Salmonella group which has made a relatively stable classification possible. Lately, additional biochemical tests have helped in some cases hitherto obscure. It is known that the typhoid bacillus is a human pathogen and that the source of an outbreak of typhoid fever, whatever its vehicle, is a human carrier. *S. pullorum* is a pathogen for birds and rarely found elsewhere than in fowls and chicken. Those species which have a wider range of pathogenicity have some habitat in which they are more frequently found, for example, *S. enteritidis* is found more often in the rat whereas the Dublin type of *S. enteritidis* is more frequently found in cattle. In addition to this knowledge, it is necessary to have at one's disposal a technique to detect not only those animals which are clinically infected with a particular species but also those latently infected. In other words, one must be able to detect "carriers" which are a source of danger to the healthy animals in their area. The method employed most frequently is a serological test whereby one determines the agglutinin content of the blood serum. The success of this procedure varies with different animal species and with different diseases. It is successful in the control of bacillary white diarrhoea of chickens and recently it proved successful in identifying the carrier cow in an outbreak of gastro-enteritis in children due to the Dublin type of *S. enteritidis*. With some animal species and with some types of Salmonella the interpretation of the test is rendered difficult because of the range of normal or natural agglutinins in the serum and also because of the complicated antigenic structure of the bacillus.

The other method of control envisaged is by the immunisation of animals with vaccines prepared from Salmonella bacteria. A certain amount of success is claimed for this procedure in human enteric fever but it has not achieved such results in animal diseases. There is thus the necessity for more work along these lines, especially on the value of chemical extracts of bacteria instead of the whole bacterial bodies. This will mean a knowledge of the relative importance from the immunological point of view of the various antigens and their chemical constitution.

At the Thirteenth International Veterinary Congress, 1938, Manninger stated that the ideal method of controlling Salmonella infection in animals was by the suppression of the sources of infection but that there were gaps in our knowledge which made this less effective. He was not prepared to admit that the methods of immunisation as practised in animal diseases due to these bacilli had been very successful. Verge dealt mainly with infectious abortion of mares, which in France is due more frequently to *S. abortus equi* than to any other cause. Diagnosis can be made by the isolation of the organism, or by a serological test. Vaccines, prepared from the growth of the bacilli on gelatin, have given good results in his hands, but this procedure induces the formation of agglutinins and this must be remembered in the interpretation of any serological test. Verge also pointed out that other measures of prophylaxis such as disinfection should be included. Miessner cited salmonella diseases of cattle, enteritis of ducks, enteritis and wing paralysis of pigeons, enteritis of the silver fox, swine paratyphoid and abortion of mares and of sheep. In most cases he advocated the use of formalinised cultures as vaccines for controlling such conditions. He pointed out, however, that the carriers in salmonella enteritis of bovines were slaughtered; that as the eggs of ducks infected with salmonella were frequently infected and liable to infect man, then the public in Germany were advised to cook duck eggs at least eight minutes before eating them; that all food of animal origin for silver foxes should be cooked; and that in infectious abortion of mares and of sheep there should be adequate cleansing and disinfection of instruments and clothing with the isolation of infective mares and ewes in addition to any other preventive measures. Fujimura dealt with infectious abortion in mares and pointed out that the organism may be isolated from the stomach of the foetus, that serological examination of mare's blood should be made frequently in breeding areas and that where the disease occurs, immunisation may be resorted to.

Other speakers dealt with the desirability of adopting the nomenclature advocated by the Salmonella sub-committee of the International Society for Microbiology, others pointed out that immunisation had not proved so effective in animal salmonella diseases as to warrant its use and they advocated the detection, by serological means, of carriers of infection and of their control. Further speakers dealt with their own particular problems, such as calf diarrhoea due to *S. enteritidis* var. *dublin* and the salmonella infections of ducks and other birds.

R. I.

[I.—**Changes in the Blood of the Cow at Parturition.** Hayden, C. E. (1938.) *Cornell Vet.* **28.** 2. 152. II.—**Seasonal Hypomagnesaemia of the Bovine, without Clinical Symptoms.** Allcroft, W. M., and Green, H. H. (1938.) *J. Comp. Path.* **51.** 3. 176.]

The biochemical blood picture of farm animals in health and disease has been studied intensively during the last decade. It was well understood by the biochemist that the first essential was to be able to gauge exactly the normal range of the various chemical constituents of the blood. Much work has, therefore, been carried out to establish the normal blood picture for the different species but despite the production of a large number of papers giving the results of countless analyses it is still difficult to say with any degree of certainty what are the maximum and minimum limits of normality. Apart from changes due to pathological conditions, some of which are well recognised, it has been noted that transitory changes due to temporary physiological upsets, such as pregnancy and parturition, take place, and that even change of diet and change of season appear to affect considerably the various constituents of the blood. Since many of these changes occur without any appearance of clinical symptoms of disease it is difficult to know whether they come within what may be termed the normal condition and environment of the animal. A study of even the above two papers reveals some of the difficulties which confront the biochemist in his endeavours to ascertain the normal range of the blood constituents.

Many authors have shown that a slight fall occurs in the phosphorus and calcium content of the blood at parturition or immediately afterwards. Since this has been established by workers both in this country and America it might be accepted as a scientific fact and one of great importance in the study of the aetiology of milk fever. Hayden, however, demonstrates that he could find very little difference in the values obtained for inorganic, lipoid, total acid-soluble and total phosphorus of the blood from eight normal cows and that from nine pregnant cows at, or shortly after, parturition. Blood samples obtained from eight cases of milk fever before treatment showed a blood picture similar to that obtained by other workers in the field of milk fever research. It would appear, therefore, that the inorganic phosphorus content of the blood does not *always* fall near parturition or shortly afterwards if the parturition proceeds in a normal manner.

The variations of the magnesium content of the blood have also proved of great interest to many workers because this blood constituent has been found to fall considerably in lactation tetany and to rise to a high value at parturition. It is important to know exactly the normal range of blood magnesium but the figures found in the literature show many variations. Allcroft and Green, in a previous paper, found the blood magnesium to range in 139 healthy cows from 1·85 mg. to 3·17 mg. per 100 c.c. of serum, whilst Eveleth recorded the normal variation as lying between 2·00 mg. and 3·50 mg. per 100 c.c. of serum. Godden and Duckworth have shown that the blood magnesium rose at parturition in two out of three cows examined. In the present paper Hayden found the magnesium content of the blood of ten normal cows to range from 2·0 mg. to 3·5 mg. per 100 c.c. and in eleven cases of milk fever to range from 2·48 mg. to 3·67 mg. per 100 c.c., and so concluded that this difference was of little significance. This is in agreement with the published findings of Green and Allcroft but contrary to the finding of Godden and Duckworth that in cases of milk fever the magnesium content of the blood was occasionally very high.

In their present paper Allcroft and Green record values for the blood magnesium of cattle, many of which are under 1·0 mg. and one of which is as low as 0·5 mg. per 100 c.c. of serum. These animals, apart from being out at pasture the whole year round, must be classified as normal since they showed no clinical signs of any disease or even emaciation and certainly no symptoms of tetany or signs of hyper-excitability of the nervous system. Such values have hitherto only been recorded for acute cases of lactation tetany and so it is now doubtful if we can regard the tetany of lactation tetany as being due to hypomagnesaemia. Other interesting data recorded in this paper relate to the finding of a seasonal variation in the serum magnesium of these animals which so far has not been co-related to the magnesium content of the pasture. Winter values were found to be very much lower than summer values and this was found to occur in practically every animal under experiment. The feeding of magnesium oxide appeared to affect only slightly the acuteness of the fall.

Blood analysis as an aid to the clinical diagnosis of animal diseases may be already well established but the above papers show the necessity for much more intensive work along biochemical lines before it will take the important place it already holds in the clinical diagnosis of human diseases.

J. S.

[**The Problem of Vitamin A Deficiency in the Diet of Farm Animals.** Sen, K. C., and Seshan, P. A. (1938.) *Ind. J. Vet. Sci. and Anim. Husb.* **8**, 169.]

The authors attempt to sum up the present position of avitaminosis A, so far as it relates to the practical feeding of farm animals, but the vast literature which now exists on this subject makes the task very difficult in the amount of space at their command. They show that cereals, vegetable oils and oil-cakes are especially poor in vitamin A and carotene and that green young plant food is alone satisfactory as a source of this vitamin. They discuss the vitamin A requirements of rats, dogs, poultry, swine and cattle and stress that the pig requires very little vitamin A—a 100 lb. pig needs only 4 mg. carotene for maintenance and growth. These requirements are still doubtful and need much careful working out. The excretion, storage and depletion of reserves due to reproduction and milk production are described.

The authors emphasise that for farm animals the chief source of supply must be green food.

J. S.

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[**Notes on Two Cases of Naturally-occurring Toxoplasmosis of the Dog in Baghdad.** Machattie, C. (1938.) *Trans. Roy. Soc. Trop. Med. and Hyg.* **32**. 2. 273-276. 16 figs., 15 refs.]

Machattie records two fatal cases of toxoplasmosis in Baghdad street dogs in which dyspnoea and wasting appeared to be the main symptoms. At *post-mortem* examination, the parasites were found to be most numerous in the lungs which, with the liver, showed lentil-sized necrotic foci; in sections the *Toxoplasma* parasite was seen within large endothelial and other cells while areas of necrosis were produced with much cellular degeneration and liberation of parasites. The author describes the morphology of the organism, noting that the complete lack of kinetoplast serves to distinguish it from *Leishmania*. Although *Toxoplasma* is known to divide by binary fission, Machattie draws attention to the regularly occurring pear-shaped contour of large masses of parasites which closely resemble schizonts and which occur only in the lungs. The disease seems to have a seasonal occurrence, a point which may influence its incidence, and appears during the coldest time of the year.

J. N. O.

REPORT

[**Tanganyika Territory.** Report of the Department of Veterinary Science and Animal Husbandry for 1937.]

This extensive report of 158 portfolio pages is the most comprehensive and instructive yet issued by this enterprising Department. It is well arranged into sections, each section being contributed by the responsible officer in charge.

There are also some excellent photographs to illustrate certain points in the text.

It is gathered from the Director's introductory chapter on the general livestock position that soil erosion and overcrowding of animals in certain areas have now become a big problem, and in years of drought mortality from starvation in a single district might involve some hundreds of thousands of animals. Two factors appear to be mainly responsible for this, namely, lack of suitable pasture treatment and the expansion of tsetse belts. Investigations are being conducted into the former at the Department's experimental station, but so far no headway is being made in the restriction of tsetse migration. The disease position had a severe setback also during the year. Rinderpest control was ineffective over large areas, pleuro-pneumonia threatened a serious epizoötic, tsetse belts expanded, and ticks and worms multiplied rapidly in the over-stocked areas. "Yet, on the whole, except for sheep, it was a good year for stock—of such overwhelming importance is food in a country where disease slays in thousands and starvation in tens of thousands." The implication in this apt quotation is that on account of a bountiful rainfall during the year large numbers of deaths from starvation were prevented.

The disease-control section, contributed by Mr. Lowe, deals at length with the arduous activities of the field veterinary staff, who appear to have been waging a losing encounter against epizoötic rinderpest and pleuro-pneumonia and at the same time endeavouring to keep epizoötic East Coast fever and trypanosomiasis, amongst others, in reasonable check. It is difficult for us here at home, who are accustomed to relatively mild enzoötic diseases, to visualise in its true perspective the unenviable position of a handful of our colleagues in countries like Tanganyika, where transport and police facilities are so poor, when they are faced time and again with waves of virulent disease without adequate help. Let us hope the time is not far off when this small band of workers will be suitably augmented.

The work of the pathology section of the Research Institute (contributed by Mr. Evans) was confined for the most part to routine duties.

It seems strange that greater facilities, more particularly by way of research staff, are not provided in this fundamental section of the Department. Some observations on brucellosis and trypanosomiasis are recorded, however. These will be abstracted in a future issue of this journal.

In the animal husbandry section there are some excellent contributions by Mr. Hornby (the Director), Mr. French (the Department's chemist), and Mr. Staples (the botanist). These also will be abstracted in our later issues. Improved systems of soil conservation and treatment have borne profitable results in the experiments conducted. A critical review of the breeding problems of the country is given by Mr. Hornby. It appears that for the present, at any rate, selection of native animals of outstanding quality is more suitable for the country in its present disease-ridden state than grading-up from imported animals. This appears to be a wise policy, particularly in view of the calamitous results of disease experienced in other Colonies where importation of highly susceptible animals has added fuel to a furnace already aglow with simmering native diseases. The work of the chemist and the botanist is of outstanding merit as recorded in this report. Their contributions to the problems associated with the improvement of indigenous animals and plants are very material and indicate the extreme value such experts can be to a Department in which they are working in collaboration with other officers under the control of its Director. W. K.

TRANSMISSION OF SPECIMENS THROUGH THE POST

A recent publication of the Clinical Research Association—a large organisation which provides laboratory service for medical men—stresses the necessity for strict conformity with the Post Office regulations governing the transmission of pathological specimens through the post. Such specimens, it is observed—and we have confirmed the correctness of the statement—will be confiscated if not sent in accordance with these instructions, which it should particularly be noted require that pathological specimens packed according to Post Office regulations may be sent only by *letter post*. They may not, under any circumstances be sent by parcel post. We draw the attention of our readers to this point, as it would appear that many veterinary surgeons, including members of laboratory staffs, regularly send specimens of organs, urine, blood, faeces, etc., by parcel post. The source we have quoted adds that such specimens are not infrequently reported missing!

REVIEW

[**"Textbook of Comparative Physiology."** By C. G. Rogers, Ph.D., Sc.D. Published by McGraw-Hill Publishing Company Ltd., W.C.2, 1938. 30s.]

The book belongs to the publishers' series in the zoological sciences and was originally published in 1926. For this new edition the text has been revised and the work moulded into the form of a book for students. Much material, not strictly physiological, has been supplied, but three early chapters are devoted mainly to physical and chemical phenomena of importance in physiology.

The book surveys the whole animal kingdom and brings home clearly the fact that there are many instances in which a common function is being performed in different types of animals by organs of very different structure, a fact which may lead eventually to some modification in the classification of animals by morphology alone. The fact that many physiological processes are common to large numbers of widely different animals makes it possible in the study of any particular process to choose forms in which that process is clearly isolated or takes place under the least complicated conditions.

It is natural perhaps that in a size-limited book of such wide scope reviewers will see omissions. One might complain that the valuable lessons to be learnt from the similarity of the changes which take place in muscle metabolism and in alcoholic fermentation would be worthy of some mention in a book which brings out so much that is similar in different organisms. Greater description might also have been given of the changes by which cells of various types gain their energy. But these omissions are inevitable and to some extent their importance is a matter of personal outlook or taste.

Throughout the book a wide view of physiology is taken so that it forms a useful companion to the more specialised books entitled human or veterinary physiology, and makes one realise that these divisions of the subject are more often a matter of emphasis rather than one of fact. A more thorough study of the comparative aspects of physiology would probably be a valuable asset to the veterinarian. The book can be recommended to the veterinary student particularly in the first two years, although it will retain much of its interest in subsequent years.

Speaking at Tewkesbury recently Mr. W. S. Morrison, then Minister of Agriculture, stated that good progress had been made in the Government review of the agricultural situation and the time seemed propitious for a further advance in agricultural policy.

N.V.M.A. DIVISIONAL REPORT

Central Veterinary Society

The Central Veterinary Society met at the Conway Hall on the evening of Thursday, January 5th, 1939, with the President (Mr. Nevill S. King) in the Chair. The principal feature was the presentation by Mr. E. G. White, B.Sc., M.R.C.V.S., of the Research Institute in Animal Pathology, London, of "Some Observations on Autopsy Technique and on the Selection of Material for Laboratory Examination," the discussion being opened by Mr. F. W. Withers, M.A., M.R.C.V.S., also of the Institute, and well sustained.

Those present, in addition to Fellows already mentioned, were Miss M. L. Bingham, Messrs. H. E. Bywater (Hon. Secretary), W. Brown, C. Formston, S. L. Hignett, J. W. H. Holmes, H. Kirk, H. D. Land, Major Glyn Lloyd, Mr. A. B. MacIntyre, Dr. J. McCunn, Professor W. C. Miller, Mr. W. A. Paul, Miss K. M. Sanderson, Mr. N. J. Scorgie, Dr. A. W. Stableforth, Mr. Alex Thomson, Miss D. Uvarov, Mr. J. Willett and Professor J. G. Wright, together with the following visitors: Mr. A. A. B. Ellis, Miss M. G. Hignett, Miss D. Howell, Messrs. D. L. Hughes, J. W. R. Pearce and A. N. Worden.

The minutes of the December, 1938, meeting, having been published in the *Veterinary Record*, were taken as read and were confirmed and signed.

Correspondence

(1) From the following Fellows, regretting their inability to attend: Dr. W. P. Blount, Mr. S. F. J. Hodgman, Dr. R. F. Montgomerie, Mr. S. J. Motton, Maj.-Gen. Sir John Moore, Mr. J. F. D. Tutt and Dr. W. R. Wooldridge.

The Hon. Secretary was instructed to write to Mr. Tutt expressing the regret with which the Society heard of the illness preventing his attendance, and their hope for his speedy restoration to health.

(2) From the Secretary of the National Horse Association of Great Britain, enclosing the Association's Quarterly News Sheet and inviting a continuation of the Society's subscription.

It was agreed that this be renewed and that the same sum as last year, *viz.*, £5 5s. 0d., be forwarded.

(3) From the Secretary of the Royal Sanitary Institute, inviting the appointment of delegates to the 1939 Health Congress of the Institute, to be held at Scarborough from July 3rd to 8th.

On the proposition of Professor Wright, seconded by Mr. J. Willett, it was resolved that a delegate be sent and the requisite fee (£1 11s. 6d.) paid. The Hon. Secretary accepted the invitation extended to him to attend the Congress on the Society's behalf.

Elections and Nomination.—Miss D. Howell, of Waltham Abbey, and Mr. J. A. Pasfield, of Walton-on-Thames, who had been nominated at the previous meeting, were unanimously elected Fellows of the Society, and the nomination was made of Mr. A. N. Worden, of the Lister Institute of Preventive Medicine (proposed by the Hon. Treasurer, seconded by the Hon. Secretary).

Morbid Specimens and Case Records

Mr. E. G. White said that he had two conditions to bring to their notice. The first, in the dog, was perhaps best described as osteoperiostitis. This condition was described in the *Veterinary Record* by Smythe ten years ago as tuberculosis of the bones. The lesions were not, however, due directly to the tubercle bacillus and they had recently had a case of primary adenocarcimoma of the liver in a dog with similar bone lesions; this was one of the three cases presented to them.

The lesions most commonly affected the long bones of the limbs and were usually symmetrical. The whole skeleton, including the skull and pelvis, might show the characteristic changes. One of the cases presented showed lesions more advanced than any he had seen recorded in the literature and many of the bones were almost unrecognisable. The third case he had brought there that evening was that described by Professor Wooldridge and Mr. Holmes in the *Veterinary Record* of April 24th, 1937.

Similar bone lesions are met with in man, the horse and the fowl, and a very advanced case was illustrated in a lion in Herbert Fox's book on "Diseases of Wild Animals in Captivity."

In these three instances lameness was one of the clinical features and radiographs showed a characteristic picture. Pulmonary disease—tuberculosis or neoplasia—is the commonest associated factor in animals and interference with general oxidation has been suggested as the causal factor. The condition has not been reproduced experimentally.

The second case might be of interest and had been received at the department only that day. At 1 p.m. a carcase of a three-week-old Friesian calf was brought to the department with the information that three of these animals had died during the past 24 hours with symptoms lasting only 15 to 30 minutes. The symptoms comprised staggering, stumbling into objects apparently due to blindness, convulsions and death. No striking lesions were found in the two animals on which a *post-mortem* had been made apart from petechial haemorrhages.

An autopsy revealed the only lesions to consist of petechial haemorrhages in the thymus and lungs. A quantity of pink froth was found in the trachea. The rumen showed a few black scales mixed with its contents and in the abomasum a much larger number of such scales were found. A few of these scales were examined rapidly by Dr. Clough to whom the possibility of lead poisoning had been suggested by Mr. White. Within a few minutes the presence of lead had been shown by qualitative tests including the formation of golden crystals of lead iodide. [These, together with some of the black scales from the abomasum, were demonstrated to the meeting.] The scales probably consisted of lead paint which had been largely converted to lead sulphide (black) by the action of sulphuretted hydrogen within the rumen.

[Mr. White forwards for publication, as being of interest in establishing the origin of the lead, the following letter since received from the veterinary surgeon responsible for sending to the department, for a further *post-mortem* examination, the carcase of one of the calves in question:—

"The condition appears to be of a very acute nature. According to the owner, the affected animals suddenly became delirious and appeared to be in great pain. Death occurred within a very short period. *Post-mortem* revealed the following:—

Fore Stomachs and Abomasum.—In these organs nothing abnormal was detected.

Kidneys.—These seemed very soft in consistency, the cortex was rather pale and the medulla engorged.

The thoracic cavity revealed the most characteristic lesions.

Heart.—There were marked sub-epicardial haemorrhages and in one case these were very extensive. The parietal pleura was congested in both cases.

Thymus.—This had numerous petechial haemorrhages.

"The loose boxes in which these calves were housed had been painted about a month previously and it was noted that in places the paint had been licked off."]

About a year ago a similar case was encountered in a young calf in which similar lesions were found together with black scales in the rumen. In this case subsequent enquiry revealed that the animal had been seen licking a newly painted hurdle placed across the stall to form a partition. In this case, also, the total duration of symptoms was rather less than half an hour.

Mr. White stated that the presence of these black scales—which were fairly soft and left a black mark when rubbed on the fingers—appeared to be diagnostic. There was no simple method for testing for lead in the field and material should be submitted to an analyst for examination.

The Hon. Secretary said that with regard to the shortness of the interval that might elapse between the ingestion of lead by a bovine and the death of the animal, he reported to the meeting of the Society at which Dr. Clough gave a paper on toxicology, the case of a heifer turned out in a builder's yard. The heifer was enjoying a meal of white lead at 8 o'clock in the morning and died in the afternoon.

Professor Wright also contributed to the discussion, expressing the wish, however, that his remarks be not published.

Mr. White stated that for the practitioner attempting to diagnose the condition, lead poisoning, those black scales in the rumen—they were much more numerous in the abomasum, however—were really diagnostic. There was no rapid method of testing for lead; the only thing to do was to take a sample to an analytical chemist. In these cases, he presumed, the lead would be converted into the sulphide.

Mr. J. Willett's New Year Honour

The President said that as it did not appear that any further specimens or case reports were forthcoming he would like, before they passed on to the next item on the agenda, to offer, on their behalf, congratulations to Mr. John Willett on his being mentioned in the New Year Honours List. Mr. Willett, they were pleased and gratified to know, had been awarded membership of the Victorian Order. (Applause.)

Mr. Willett, returning thanks, observed that as they knew, he appreciated deeply the honour awarded to him. He looked upon it as a recognition which would give a certain amount of satisfaction to the profession as a whole. (Hear, hear.)

Paper.—The President now called upon Mr. E. G. White to read his paper, "Some Observations on Autopsy Technique and on the Selection of Material for Laboratory Examination." Mr. White's paper was heard with much appreciation and, as already intimated, evoked a good general discussion following Mr. Withers' informative opening. [The paper is reproduced, together with the report of the discussion and of the essayist's reply thereto, at the commencement of this issue.—*Editor.*]

The President proposed that a very hearty vote of thanks be accorded Mr. White both for his admirable paper and for the interesting specimens and case records he had also contributed, which had provided a memorable evening's enjoyment.

The proposal was carried with acclamation and, there being no other business, the President declared the meeting closed.

H. E. Bywater, *Hon. Secretary.*

SOME CONTEMPORARY CONTRIBUTIONS TO OUR KNOWLEDGE OF ANIMAL HUSBANDRY

(*Continued from page* 60)

A Treatment of Slippery Cowshed Floors

Messrs. Scriven and Kennedy outline a method for reducing the slipperiness of cowshed floors in the January issue of the *Journal of the Ministry of Agriculture*.

They point out that danger, inconvenience, and financial loss may readily occur through slipperiness in byre floors, due to such causes as:—

(1) Faults in the mixing and finishing of the concrete.
(2) Insufficient washing of floors with water.
(3) Too steep a fall in the floors.

Injured backs, big hocks and knees and damaged udders are common among dairy cows, and are frequently caused by animals falling on entering or leaving byres when floors are slippery. Further, on such floors cows become nervous, which reacts on milk yield, especially if a fall occurs just before milking, while workers must move with great deliberation and extra caution.

Several methods of roughening floors are available. The concrete may be chipped with hammer and chisel; it may be roughened with an electric or pneumatic drill; or sand or carborundum powder may be spread on the surface. There are obvious objections to each of these methods, and there is room for exploration of other methods.

The authors considered that various chemicals might be used. They point out that cheese makers have long realised that tiles or blue bricks (*e.g.*, "Staffordshire blue bricks") are better for dairy floors, since they resist the action of whey, which contains about 3 per cent. lactic acid, better than concrete. A mineral acid might, therefore, be expected to cause roughening of a concrete surface, and experiments were devised.

Laboratory tests were carried out on concrete blocks with various mineral acids, and it was found that hydrochloric acid readily attacked the carbonates in concrete, but left the sand and granite as rough projections. The time taken to effect roughening depends upon the strength of the acid and the quality of the concrete, the weaker the acid the slower the process. Chemical action can be easily arrested by the use of an alkali, *e.g.*, soda carbonate solution, but it is automatically arrested in time as the neutralisation of the acid occurs from the concrete itself. After laboratory tests were found satisfactory, practical trials were arranged on farms.

They reached the following conclusions. About 25 per cent. strength of commercial hydrochloric acid should be left on the floor for about 20 minutes. The first trial was in a double-rowed byre holding 60 cows, with a centre gangway 112 ft. long and 6 ft. wide. Two men were needed. Clay was built up along the edge of the gangway for six yards on either side and at the drain outlets. The dilute acid was poured from an enamelled bucket along the middle of the passage and gradually allowed to run to the outside edges. More acid was run on as required, and in 20 minutes all was washed away with water. This was a wasteful method, and on the next six-yard length one man poured on the acid and another spread it and prevented it from running to the edges too quickly, using a stiff brush. When the floor was washed it was found that a far more evenly roughened surface was obtained. Later, it was found possible to dispense with the clay edging, control of the acid being obtained by brushing. Any which spilled into the dung channels was allowed to act on them. Before releasing down the drains the acid was neutralised and then washed away. The standings for about 2 ft. 6 in. at the rear were similarly treated. Surfaces were still satisfactorily rough six months after treatment, and probably would last much longer before again becoming slippery.

In another shed full-strength commercial hydrochloric acid was used. The floor was washed and scrubbed to remove dirt, a ridge of clay was used along the back edge of each standing, six being dealt with at a time. The acid was poured on and spread with a brush. Great care is necessary when using full-strength acid, especially when pouring from a carboy into an enamelled jug. The acid was allowed 15 minutes to act, and then by a rubber squeegee moved over to the next standing, and so on, further acid being added where required, flushing with water first to dilute any unexhausted acid, and then with soda solution, and a final rinse with water completed the process. Milking passage and dung channel were treated subsequently.

Cows were subsequently noticed walking freely and with confidence and without the signs of fear and nervousness which they had shown before the surface was roughened.

Materials required are one or more carboys of commercial hydrochloric acid—each carboy (ten gallons) is sufficient for about 58 sq. yards of floor surface; an old enamelled jug or bucket for pouring on the acid; a bucketful of well-puddled clay and a trowel; a worn stiff broom and a squeegee; rubber boots and rubber gloves are desirable and an old mackintosh will protect clothing from splashes. A plentiful supply of water is essential, and a quantity of ordinary washing soda should be available. A responsible person should supervise the operation, and should ensure that all doors, windows and ventilators are open so that fumes do not accumulate.

No animals should be allowed in the building during treatment. Acid should be prevented from entering drains. It should be neutralised first to prevent action on the cement luting, which may be very rapid and lead to leakage. The outlets from the byre should be plugged with clay, which is removed only when the acid is all neutralised.

The cost per cow is about 10d. only, and since the process can be carried out by the ordinary farm staff under supervision, labour charges do not necessarily need to be included.

Representative costings are as follows:—

(1) Two 10-gallon carboys of acid	£1	0	0
14 lb. washing soda		1	0
Labour: Two men for five hours @ 10d. per hour ...		8	4
Cost for treating shed for 60 cows	£1	9	4

= 6d. per cow (approximately)

(*Concluded at foot of column* 1, *page* 182)

IN PARLIAMENT

Veterinary Education in Great Britain

The following are among the questions and answers recorded in the House of Commons since the House reassembled at the end of January:—

Veterinary Education

On February 1st, Sir A. Wilson asked the Minister of Agriculture (1) whether he has considered the very serious condition of veterinary education disclosed in the report of the Inter-Departmental Committee on Veterinary Education published last September; and whether the urgent need for greatly increased financial aid from the Exchequer, disclosed in the report, will be met by making the necessary provision in his Department's estimates for the forthcoming year;

(2) whether, in order to further the policy of the Government on the eradication and control of the diseases of farm animals, he is in a position to say that the recommendation of the Inter-Departmental Committee on Veterinary Education that each veterinary school should possess a field station for training in preventive and curative medicine associated with farm stock, is likely to be adopted in the near future;

(3) whether, in view of the importance of an adequate training for veterinary practitioners, he will consider ensuring more liberal assistance from his Department to the centres for veterinary education in this country than has been given heretofore?

Mr. W. S. Morrison: I fully realise the importance of the recommendations contained in the recent report of the Committee on Veterinary Education in Great Britain, and, having regard to their far-reaching nature, the Secretary of State for Scotland and I have thought it desirable to seek the views of the institutions and professional bodies likely to be affected. The hon. and gallant Member can be assured that the report of the committee will receive our most careful consideration. In the meantime, the maintenance grants are being increased in certain cases.

On the following day Mr. Markham asked the Minister of Agriculture (1) whether the recommendations of the Inter-Departmental Committee on Veterinary Education have yet been considered; whether the Government propose to adopt the recommendations; and whether the necessary legislation will be introduced during the current Session;

(2) whether he has considered the means suggested by the Inter-Departmental Committee on Veterinary Education for bringing veterinary education into closer connection with the universities; and whether it is proposed to facilitate the necessary steps to implement the policy suggested?

Sir R. Dorman-Smith: I would refer my hon. Friend to the reply which my right hon. Friend the Chancellor of the Duchy of Lancaster gave to the hon. and gallant Member for Hitchin (Sir A. Wilson) on February 1st.

. . . . .

Poultry Industry

On January 31st, Mr. Mathers asked the Secretary of State for Scotland whether he is in a position to make a statement of Government policy in relation to the Scottish poultry industry?

Mr. Colville: A Bill to give effect to the policy relating to the poultry industry which has already been announced by the Government is in course of preparation. It is the intention that the Bill should be taken during this Session, but I am not at present in a position to say when it will be ready for introduction.

Mr. Mathers: Does the delay in connection with this matter mean that the big general farmer has been able to make his voice heard and that the little fellow dealing with poultry is being ignored?

Mr. Colville: No, Sir, the hon. Member is wrong. A Bill will be introduced as soon as can be.

Later in the day, Mr. De la Bere asked the Minister of Agriculture whether he is now in a position to make some statement regarding future legislation in connection with the poultry industry?

Mr. Turton asked the Minister of Agriculture whether he can now state when he will introduce the Poultry Bill?

Mr. Mathers asked the Minister of Agriculture whether he is now in a position to make a statement of Government policy in relation to the poultry industry?

The Minister of Pensions (Mr. Ramsbotham): I have been asked to reply. I would refer my hon. Friends and the hon. Member to the reply given earlier to-day to the hon. Member by my right hon. Friend the Secretary of State for Scotland.

Mr. Mathers: Cannot the hon. Gentleman be more precise than that—speaking for the Departments principally concerned?

Mr. Ramsbotham: If the hon. Gentleman will read my reply he will see that I have given him the information for which he asks.

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Food (Inspection)

Mr. Benjamin Smith asked the President of the Board of Trade whether he is aware that food is sometimes transferred from an incoming to an outgoing vessel without inspection; that the arrangements for the examination of food to be consumed by passengers and crews are often

(2) Two 10-gallon carboys of acid	£1	0	0
14 lb. washing soda		1	0
Labour: Three men for three hours @ 10d. per hour ...		7	6
Cost of treating three single cowsheds, including passages, dung channel and standings for 32 cows ...	£1	8	6

= 10½d. per cow (approximately)

unsatisfactory; and whether it is his intention to strengthen and make more comprehensive the entire system of food inspection on British vessels?

Mr. Stanley: I have received no complaints about the transfer of stocks of provisions from one ship to another, nor in regard to the system of inspection of foodstuffs for consumption on board ship, but I should be pleased to arrange for inquiries to be made into any case which the hon. Member may have in mind, if he will send me particulars.

Attested Herds (Carmarthenshire)

Mr. Hopkin asked the Minister of Agriculture how many attested herds there are in the county of Carmarthen up to date; how many herds are waiting to be tested; what is the cause of the delay in testing; for what length of time was testing suspended; and is he satisfied that the number of veterinary staff is sufficient to cope with the farmers' demands for testing their herds?

Mr. Ramsbotham: There are 1,419 attested herds in the county of Carmarthen, 333 herds awaiting official test and 370 herds undergoing assisted tests. While in certain cases more than the minimum period of 60 days after the last assisted test carried out by the owner's veterinary surgeon may elapse before the official test is made, generally speaking there is no considerable delay nor has there been any suspension of this work. The veterinary staff in the county has recently been augmented, and my right hon. Friend is satisfied that, subject to the occasional necessity for diverting certain of the veterinary inspectors to other duties of exceptional urgency for short periods, the staff engaged in the testing of herds is sufficient. The position is, however, being kept under constant review.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Feb. 13th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4 p.m.

Feb. 15th.—Annual General Meeting of the Scottish Metropolitan Division, N.V.M.A., at the Royal (Dick) Veterinary College, Edinburgh, 3 p.m.

Feb. 17th.—Annual General Meeting of the Eastern Counties Division, N.V.M.A., at Norwich, 2 p.m.

March 2nd.—Voting Papers for R.C.V.S. Council Election issued to members overseas.

Mar. 17th.—Meeting of the Welsh Branch, N.V.M.A., at Cardiff.

July 23rd—28th.—N.V.M.A. Congress at Great Yarmouth and Gorleston-on-Sea.

THE LOVEDAY REPORT

The "British Medical Journal" Review

The following review, which is of particular interest in so far as it has appeared (February 4th, 1939) in our own prototype in the medical profession, namely, the official organ of the British Medical Association, will be read, we feel sure, with deep appreciation by all members of the veterinary profession:—

"The report of the Committee on Veterinary Education in Great Britain gives the findings and recommendations reached by a Departmental Committee set up by the Ministry of Agriculture and the Department of Agriculture for Scotland. It makes a formidable indictment of the present state of veterinary education in Great Britain. The opening paragraphs point out that the veterinary surgeon is the physician of the farm, the guarantor of the nation's food supply, and that his functions extend far beyond those surgical duties suggested by his title, embracing the control and eradication of disease among livestock, and the giving of advice on all matters concerned with animal breeding and nutrition, as well as various administrative duties.

"British livestock is an important national asset. The annual output of food products approximates £200,000,000 (being £191,000,000 for 1936-37). Estimated losses from disease amount to some £19,000,000 annually. The veterinarian is therefore an important factor in the nation's wealth, and indirectly, since many diseases of animals are communicable to man, in the nation's health. In the introduction to the report an outline of what has been achieved in eradicating disease among livestock is given, but it is easy to demonstrate that even though much has already been done, more remains to be done. From a purely economic approach there is consequently a *prima facie* case for the adoption of vigorous measures to improve the standard of education of the veterinarian as an insurance against future losses among the animal population.

The Present Position Criticised

"It should be pointed out that throughout the report it is emphasised that the major blame for the unsatisfactory state of affairs must rest with the Government. Veterinary education has been seriously starved of adequate financial support. Since the War a considerable amount of financial assistance has been given to veterinary research, but no comparable sums have been spent on education. The report analyses the present position with reference to each of the four veterinary schools—in London, Edinburgh, Liverpool, and Glasgow—and makes a series of recommendations applicable to each. In addition, plans are outlined with reference to a proposed school for specialised training in research to be established at Cambridge. There are some who may criticise the suggestions regarding Cambridge, on the ground that if implemented they may create special facilities for those only who can afford to go there. This will give them an advantage in training over students who cannot afford this expense, and possibly lead to a stifling of potential ability.

"In addition to specific recommendations for each of the schools, the present curriculum of veterinary study is drastically criticised. The deficiencies in the present system of training, the

lack of fluency in the course, and the discrepancies in training in the basic subjects are discussed and a new curriculum of study which is calculated to correct these errors is proposed.

"The system of professional government by the Royal College of Veterinary Surgeons is given some attention. This body exercises an autocratic control over the conduct of the professional examinations. It elects its own examiners and awards the qualifying diploma of membership. Besides this, it exercises disciplinary professional functions over its members and attempts to protect the profession from the encroachments of unqualified practitioners. The report recommends that the Council of the R.C.V.S. should be given power to include on the Council and Examination Committee representatives of the veterinary schools of the five Universities of Cambridge, Glasgow, Edinburgh, London, and Liverpool.

Constructive Recommendations

"A definite innovation is the suggestion that at the end of the first three years of study students should have the opportunity of taking a degree in science on their way to the professional qualification of M.R.C.V.S. The subjects which will be included in the study for this degree are the basic subjects of chemistry, and physics, biology, anatomy of the domesticated animals, histology and embryology, general physiology and biochemistry, applied physiology, veterinary pathology, bacteriology, and immunology, and veterinary parasitology. The more purely professional subjects—animal husbandry, hygiene, toxicology, pharmacy, medicine, surgery, and clinical work, etc.—are suggested for the fourth and fifth years of study.

"It is refreshing to note that for the first time the official recommendation is made that instruction in animal husbandry and clinical subjects should take place in field stations attached to the teaching institutions. Veterinary education has somewhat blindly followed medical educational practice by becoming centred in cities and large towns. Whereas there is every justification for maintaining medical educational institutes in the centres of large human populations, where facilities for clinical study, hospitals, asylums, etc., are concentrated, it is obviously illogical to maintain veterinary teaching centres exclusively in towns instead of making close contacts by means of field stations with centres where animal populations are concentrated. With the disappearance of the town dairy, and with the marked reduction in horse transport of goods in cities, the only species of animals met with in abundance in the cities are dogs and cats. The veterinary hospitals in cities are consequently filled with these animals, and the numbers of farm animals available for student instruction are becoming more and more limited.

The Preventive Aspect of Veterinary Medicine

"A further important reason for recommending the institution of field stations is that a change in outlook is slowly coming over the veterinary profession. While the sole emphasis in the past has been upon disease and its treatment and control, the functions of the veterinarian now include the much more positive aspects of prevention. Health as well as disease now enters the field as a subject for study. It is for this reason that the report recommends a more prolonged study of physiology and especially applied physiology, and a far more extensive course in animal husbandry, hygiene, and nutrition. In order that these latter subjects can be adequately studied and taught there seems no alternative but to provide a field station, where first-hand instruction and *ad hoc* demonstration can be given.

"It is a curious criticism of the present system that no effort has been made earlier to provide facilities for this aspect of teaching, and it is a just criticism that these important components of proper veterinary education cannot be adequately taught with the present facilities in schools situated in purely urban areas.

"The report recommends the expenditure from Treasury funds of a capital sum of £299,000 and recurring annual grants rising to £61,350, together with such sums as may be needed for the maintenance of field stations. It must be pointed out in this connection that the sums recommended are comparatively paltry when the capital value of the livestock of Britain is remembered, or even when the annual loss of £19,000,000 from disease is borne in mind.

"Doubtless, there may be adjustments and perhaps compromises necessary before the State implements the recommendations; but there can be no doubt that the principal of these recommendations, if acted upon promptly, will result in a marked improvement in the quality of veterinary education and in the status of the veterinary profession. It is to be hoped that an opportunity such as this report offers to a sister science and a co-member of the healing profession with human medicine will not be neglected by those concerned."

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FREEDOM OF THE UNIVERSITIES

In our series of editorial articles upon the Loveday Report we had occasion to discuss the advantages accruing to veterinary education from affiliation with the universities. We quoted in particular certain views recently expressed by Lord Baldwin upon the imperative need of maintaining the administration of our universities in a state of complete freedom from bureaucratic or other political control, so as to ensure that the liberal atmosphere prevailed in them that is necessary for the development of research and teaching. We mentioned that with the much increased State assistance required for a proper system of modern veterinary teaching it was essential for us to pay heed to this warning, in considering the recommendations made by the Loveday Committee for close association between the veterinary schools and the universities.

The following leading article recently published in *Nature* (February 4th, 1939) throws a good deal more useful illumination upon the above problem.

"With what now seems almost prophetic insight, the report of the University Grants Committee in 1936 referred to the special responsibility of the universities of Great Britain, in view of the suppression in the universities of several European and other countries of all independent thought and critical discussion of the principles of government or of the meaning of life, if the Greek tradition of candid and intrepid thinking

about the fundamental issues of life is to be preserved for mankind. That responsibility has grown the heavier in the last three years. The area in which freedom of thought and learning is proscribed has grown larger year by year, and further waves of refugees have added to the burden of the Society for the Protection of Science and Learning, and converted what was possibly at first regarded as a temporary into an apparently permanent or perennial task.

"There are welcome signs that their responsibility is nobly recognised by the universities of Great Britain. In one practical form it is seen in the support which has been forthcoming from them for the work of the Society for the Protection of Science and Learning. A series of meetings has been arranged for the first week in February in the majority of British academic centres, in which many leading men of science have promised to take part, including Sir William Bragg, Sir Henry Dale, Sir Richard Gregory, Professor Winifred Cullis, Professor F. A. E. Crew and others. The Royal Society, in collaboration with the British Academy, is giving a special reception to the academic exiles and those who have been working in their interests on February 7th, and on February 10th the evening discourse at the Royal Institution is to be given by Professor Max Born, one of the many distinguished men of science who have found refuge in Great Britain.

"This practical assistance is of importance not only on the grounds of humanity but also in the interests of learning itself, by enabling those who in the past have made important contributions to knowledge to resume their studies or investigations. Besides this, however, there is a rapidly growing volume of evidence that members of the universities of Great Britain, whether engaged in teaching or administration, are fully alive to the importance of preserving their full freedom of teaching and investigation. In a striking address to the Conference of Education Associations on 'The Function of the University,' Lord Macmillan asserted that the first essential of a university must be its spirit of intellectual freedom. A university must be the servant of truth, and have no other bondage whether of race, State or creed.

"Lord Macmillan put freedom in the very forefront of the life of the university, as it is known in Great Britain. It is the essence of knowledge that it should give freedom to those who pursue it. To seek to impede the free interchange of thought and ideals is the supreme crime. The noblest task which the universities can perform is not only to maintain among ourselves the constant and free pursuit of truth, but also to use every endeavour to spread its light throughout the world, so that it penetrates even to those countries where the universities are subservient to the State.

"No less striking were the speeches at the recent degree ceremony when the Duke of Devonshire was installed as Chancellor of the University of Leeds. In welcoming the Chancellor, Mr. B. Mouat Jones referred to him as one who, by tradition and conviction, accepted both the universality of knowledge and the trust imposed upon universities to safeguard the liberty of thought and to defend the free spirit of man. In returning thanks for his election, the Chancellor responded on the same note. Of all the forces working for good in the world, for better understanding between peoples, for liberalism and tolerance in the highest sense of the words, for the spreading of true knowledge, the universities and all that they stand for are, he said, perhaps the most important. They are playing a greater part than ever in the life of the nation and their influence is felt among an increasing proportion of the population. Moreover, without minimising the importance of the practical and utilitarian work at the universities, or their contribution to technical and commercial progress, a university must be a servant of truth.

"In delivering an address at the close of the ceremony, on behalf of the honorary graduates, Lord Baldwin spoke vigorously on the same theme. There are two things, he said, for which a university stands pre-eminently: standards, and truth. The more democratic we become, the more important it is to maintain our standards in literature, in art, in science, in work of all kind. Nothing should for one moment be accepted as first-rate which is in fact second-rate. The second thing is truth, which is particularly important to-day. It is not yet in danger in Great Britain and he hoped it never would be. We never want to see the day when truth is sought merely with the object of proving a case, or history written with that object. Universities must stand and be recognised as seekers for truth with no ulterior motive.

"It is a strange commentary on the distance we have travelled in the last ten years that the chancellor of a university should find it pertinent to speak thus emphatically on what a few years ago would have seemed a platitudinous theme, and to find his words so warmly welcomed. Lord Baldwin, moreover, proceeded to point out dangers which in Great Britain might affect, even if indirectly, the maintenance of such standards and the service of truth.

"For universities to uphold their trust to-day, as ever, they must be absolutely free and independent, governing themselves and regulating themselves, and never becoming subservient. Among the dangers which may threaten their independence Lord Baldwin referred first to that attending the influence of wealth. In Great Britain it is scarcely a source of danger, for when people give money to universities, it is not given with the idea of interference, but for use. It is for the universities themselves to decide in what way the gifts shall be expended. While this is generally true, in his recent book 'The Social Function of Science,' Professor J. D. Bernal refers to ways in which the freedom of a university may be restrained by conditions attached to grants, and indicates that cases of the withdrawal of donations on political grounds are known to many scientific workers. If universities are to make their full contribution to the life of the community, while their members must be careful not to lend the weight of their names or influence to the support of statements on matters of which they have no special knowledge, it would be disastrous if any such restraint prevented individual members of a university from accepting their responsibilities for playing a part in the life of the community, whether as citizens or as the leaders for which their training and ability fit them. An atmosphere of right thinking and right action is demanded as well as freedom, and this is the more important as the emphasis on the social quality of the university is increased.

"The greatest danger, however, which threatens the independence of the universities is one from which Great Britain is fortunately so far free—that of State interference. This we have seen in Europe in our own time, though had we not seen it we could scarcely have believed it.

Universities depend more and more on State grants and public money, and this dependence is likely to increase rather than to decrease. The burden of equipment and re-equipment for efficient research is one factor likely to increase the need for State assistance. The more democratic that entry to our universities becomes, and the more widely their importance in training leaders is recognised, the stronger their claims upon the State for assistance. Many of the admirable recommendations, for example, of the recent Conference of the National Union of Students on student health depend largely on State assistance if effect is to be given to them. In spite of this, as Lord Baldwin asserted, the universities must resist to the death, if it ever came, any attempt of a Government department, or of a Government of any shade of opinion, to make gifts conditional on what is taught. In view of what has happened in other countries in recent years, we must be doubly vigilant in safeguarding our own liberties and our own freedom. It is a false optimism to eschew such vigilance because there is no immediate threat, especially in the face of what is happening elsewhere in the world to-day. Circumstances can easily be visualised in which the threat might become imminent even in Great Britain. Nor is the threat confined to the totalitarian regimes. Even in the western hemisphere, religious dogma has already sought to restrain the teaching of particular scientific theories in the post-War period.

"In Great Britain, as has already been pointed out, one or two attempts have been made, if not from the Government side, to impose restraints by withholding donations or subscriptions. When university needs are growing and financial stringency threatens, it is the more important that universities should stand together in resisting such pressure and in exposing the instigators. Such danger as exists is in fact largely indirect. It arises in part from the unfortunate extent to which teaching and research are linked under our present system. Conditions which may quite legitimately be laid down in regard to the donation of a large sum for research are quite intolerable if applied to teaching. None the less, because teaching and research are so interlocked, quite unintentionally endowment of research in this way may affect the prestige or extent of freedom of teaching in a particular subject.

"Particularly is this true in the social sciences. On the universities above all lies the responsibility for developing a world conscience and a world culture if mankind is to be turned aside from the hideous road to economic self-sufficiency and war. Moral unity can only be achieved through mutual understanding, respect and approbation, and we need more than ever to bring into relief the true aim and purpose of human society. Social science in this sense can bring into being a vital relation between the university and the non-academic world, but it can only do so as long as it possesses, unchecked and unhampered, its full liberty of criticism and investigation, free from any suggestion of prejudice or bias.

"Many will recall Lord Baldwin's insistence on this same responsibility for preserving freedom and all it involves in the elimination of prejudice and of bias by the maintenance of scrupulous honesty of thought and fairness of criticism, in his welcome to the delegates to the Congress of the Universities of the Empire held at Cambridge three years ago. Scientific workers may be equally grateful for his latest reminder of their obligations and duties in this matter. Contact with many of the refugee scientific workers whom the Society for the Protection of Science and Learning has been assisting should render their own experience available for the vital task of foreseeing the threats to our great heritage of freedom and integrity of thought, and taken in due time, wise measures may be devised to minimise the danger, if not to avert it entirely. Certain it is that freedom is best served to-day by vigilance and foresight and constructive action, rather than by procrastination which may leave us merely with the option of resisting unto death."

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PERSONAL

Appointment.—Mr. David S. Clouston, M.R.C.V.S., has been appointed County Veterinary Surgeon for Shetland.

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On Leave.—Mr. H. E. Harbour, M.R.C.V.S., Veterinary Officer, Tanganyika Territory, arrived in this country during January on leave.

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LEGAL NOTES

Unsuccessful Milk Prosecution.—In the Airdrie Sheriff Court recently, Sheriff Gillies heard evidence in a prosecution by the Medical Officer of Health for the County of Lanark against William Kerr, farmer, Rigghead, Bellshill, who was charged with selling milk to an inspector which was alleged to be not genuine in respect that it was deficient in non-fatty solids to the extent of 7 per cent., contrary to the Regulations under the Sale of Food and Drugs Acts. The analysis on which the prosecution was based showed fat, 3·53 per cent., and non-fat, 7·87 per cent.

Formal evidence of the sale having been given by the inspectors, evidence for the defence was led to show that the milk had been sold as produced without any adulteration. This evidence was from the accused and his wife and son and an employee, being all those who handled the milk from milking down to the time of sale to the inspector.

Mr. Reid, solicitor, Airdrie, for the accused, submitted that while under the Regulations the fat and non-fat fell to be considered separately, from a commercial point of view the milk sold was excellent, being well above the legal standard in fat and practically equal to it in total solids. Apart from this consideration, however, he submitted that if the evidence for the defence that the milk was sold as produced were accepted by the Court as true, effect must be given to it and the accused acquitted. The Dunson Case of Lamont *v.* Rodger decided by the High Court some years ago was quoted as an authority for this prosecution. In reply, Mr. Gairns for the prosecutor referred to some English cases which he maintained put an onus on the accused which he had not discharged.

Sheriff Gillies said that he accepted the evidence for the defence in this case and accordingly, on the authority of Lamont's case, acquitted the accused. Against this decision the complainer has asked the Sheriff to state a case for the opinion of the High Court.

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ARMY VETERINARY SERVICE

London Gazette—War Office—Regular Army Reserve of Officers

Jan.—31st.—Captain R. S. Audas, M.C., having attained the age limit of liability to recall, ceases to belong to the Reserve of Officers. (Jan. 23rd).

NATIONAL NUTRITION CONFERENCE

In a recent issue we announced the decision of the Council of the British Medical Association to call a national conference on nutrition in its wider aspects—that is, in relation to national, including agricultural, policy. The conference will last three days, the dates provisionally selected being April 27th, 28th and 29th. The conference will be representative not only of the medical profession, but of agricultural producers, home and overseas, as well as of industry and education. A large variety of interested bodies will be invited to send delegates; the co-operation of a number of them has already been secured. The conference will take as its starting point the recognised food needs of the individual, if health is to be maintained. Speakers will deal with such questions as these:—

How far are these needs satisfied in this country at the present time?

What increases are required in the production of particular foodstuffs, either at home or in the Empire, to fill the gap?

How can the necessary increases in consumption be best secured—through a system of family allowances; education, including propaganda, or otherwise?

On the evening of April 28th, the second day of the conference, a public meeting will be held at which the subjects dealt with at the conference will be discussed. The Association's active interest in nutrition goes back to 1933 when a special committee on the subject was appointed. The chairman of this committee was Sir Kaye Le Fleming, now chairman of the Council.

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HYPERTENSION, NEPHRITIS, AND SALT

"Among clinicians it is thought that there is a relationship between the intake of salt and the arterial blood pressure, and hyperpiesis is often treated by limiting the amount of salt in the diet," states a recent *Lancet* annotation. "It has never been very clear why the small reduction in the volume of the blood and extracellular fluids brought about by this means should have any effect, since it has been shown that severe salt deficiency, experimentally induced, does not lower the normal person's arterial tension,* and the ingestion of salt by normal persons has little or no influence upon the blood pressure. It has, however, recently been found that the administration of sodium chloride to patients with nephritis may increase both the systolic and diastolic blood pressure very considerably,† and it appears that the effect upon the blood pressure may in some way be bound up with the nephritis. This is borne out, and in part explained, by the work of Verney and Vogt,‡ who have shown that when a chronic high blood pressure has been induced in dogs by partial occlusion of the renal artery, the hyperpiesis is enhanced by the administration of sodium chloride. This happens only if the kidney is already abnormal, and the amount of pressure-raising substance secreted by such kidneys evidently varies with the amount of work they are called upon to do. Verney and Vogt's observations provide a rational basis for the treatment of hypertension and nephritis with diets that throw as little strain as possible on the kidneys, but they demonstrate also that persons with normal kidneys and arterial pressures may take as much salt as they choose without fear of inducing a high blood pressure."

*McCance, R. A. *Lancet*, 1936, **1**, 823.
†Barker, M. H., and Robinson, R. *J. Amer. med. Ass.*, Nov. 19th, 1938, P. 1907.
‡Verney, E. B., and Vogt, M., *Quart. J. exp. Physiol.*, 1938, **28**, 253.

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H.M. STATIONERY OFFICE PUBLICATIONS

The undermentioned have been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at the following addresses: London: Adastral House, Kingsway, W.C.2, and 28, Abingdon Street, S.W.1; Cardiff: 1, St. Andrew's Crescent; Manchester: York Street; Edinburgh: 120, George Street.

	Price net s.	d.	*Post free* s.	d.
Agriculture and Fisheries, Ministry of: Diseases of Animals Acts, and Orders of the Minister of Agriculture and Fisheries thereunder, Handbook of, September 3rd, 1937. Amendments: 1a, including revised Index. October 15th, 1938. (24-37-1-37) ...	1	0	1	2
1b. October 15th, 1938. (24-37-11-37)	1	0	1	2
Statutory Rules and Orders, 1938: 1548. Poisons (Amendment) Rules, dated December 15th, 1938. (Published December 23rd, 1938)	0	2	0	2½
Health, Board of, Welsh: Circular 1755 (Wales). Food and Drugs Act, 1938. December 15th, 1938. (33-9999)	0	2	0	2½
Home Office: Air Raid Precautions Department. Training of Air Raid Wardens. (34-9999)	0	2	0	2½

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MALE HORMONES

Dealing with the above subject in its issue of November 5th, the *British Medical Journal* observes: "The testicle of vertebrates has at least two functions: the first is the formation of germ cells; the second is the secretion of substances which are liberated directly into the blood stream—the male hormones. The failure of development of secondary sexual characteristics which follows castration of the young male has been recognised for centuries, but it was not until 1849 that Berthold demonstrated that this result of castration could be overcome in the cock by grafting testicles elsewhere. Much work has since been done on isolating the substance responsible for this effect. A crystalline substance with male hormone activity, androsterone, was isolated from urine in 1931 by Butenandt.[1] A closely related substance, testosterone, was isolated from bull's testicle in 1935 by David,[2] and other substances having androgenic activity have also been discovered. They are all steroids and are closely related to a group of compounds with oestrogenic activity and to another group with progestin activity.

"Injection of pure male hormone into normal

[1] *Z. Angew. Chem.*, 1931, **44**, 905.
[2] *Acta brev. neerl. Physiol.*, 1935, **5**, 85.

and castrated animals soon led to an understanding of its function. Zuckerman and Parkes[3] in 1938 showed that the fur of the male hamadryas baboon changed after castration to that of the female, but prolonged treatment with testosterone propionate led to the gradual change from the greenish-brown of the female to the grey of the male. The characteristic cape of the male was also restored. Injection of the same substance into a castrated immature rhesus monkey[4] made the animal fiercer and more dominant. Flushing of the 'sexual skin,' such as occurs in the normal male, also came on gradually and the external genitalia grew appreciably larger. There was a notable effect upon the internal reproductive organs, which normally atrophy after castration. At necropsy the prostate, vas deferens, and Cowper's glands of the experimental animal were found to be as large as those of a normal mature rhesus monkey and histologically similar. In the female androgenic substances inhibit follicular maturation and luteinisation and suppress the menses, as Zuckerman[5] has demonstrated in the rhesus monkey. The observations of Papanicolaou and Falk[6] suggest that androgenic hormone may cause a general muscular hypertrophy. Castration of a male guinea-pig led to a diminution in size of muscles which was most readily recognised in the temporals. These returned to normal after injection of testosterone propionate but were unaffected by oestrogens. They found, too, that injection of gonadotropic hormone over a period of weeks gave rise to muscular hypertrophy in the normal guinea-pig but not in the castrated animal. They regarded this as additional evidence that the effect was wrought through the testicle. The injection of androgenic substances into the normal rat leads to a histological change in the pituitary gland, which according to Wolfe and Hamilton[7] consists of a degranulation of basophil cells. They observed an even more striking effect in the castrated rat, in which the pituitary gland underwent remarkable changes, most notable of which was an increase in number and size of basophil cells with the formation of basophil signet ring or 'castration cells.' The pituitary gland of the castrated rat returns to normal after injection of male hormone.

"In the human being male hormone is excreted in the urine in measurable quantities in both the male and the female. After a certain degree of purification the excreted hormone is estimated by measuring the comb growth in the caponised cockerel that follows injections of this material. Recently N. H. Callow, R. K. Callow, and Emmens[8] have described an improved colorimetric method of estimating the amount of male hormone in the urine which has considerable advantages over methods of biological assay. The amount of male hormone excreted by the adult female is almost as large as that excreted by the adult male. In some disorders it may be much increased, as, for example, in cases of suprarenal cortical tumours associated with the clinical conditions of virilism or basophilism. R. K. Callow[9] described a girl aged six in whom the excretion was of the order of 20 to 40 times the normal: trans-dehydroandrosterone was isolated from the urine of this patient. It is evident that androgenic substances may be produced by some other organ as well as by the testicle, and it seems likely that the suprarenal cortical tumour was responsible for this in Callow's case.

"A pure substance having male-hormone activity—testosterone propionate—is now being used in many different clinical conditions. Benign enlargement of the prostate has been treated by injections of male hormone in the belief that it is due to excessive secretion of oestrogenic substances thought to occur when the secretion of male hormone falls off in old age. A number of workers have reported benefit in selected cases in which the residual urine is small, but Clarke[10] points out that in his series of 93 mild cases of prostatic enlargement there was sustained improvement in a large number after no other treatment than instrumentation. There is obvious need for further carefully controlled work before the value of hormonal treatment of enlarged prostate can be assessed. There has been much talk about rejuvenating the aged by implanting monkeys' testicles into them. Venzmer[11] carried this treatment a step further by injecting male hormone into aged and prematurely aged subjects. He claimed good results, but made no attempt to control his experiments; and, after all, there is no evidence that the eunuch dies young—on the contrary, in many respects he never grows up. Desmaret and Capitain[12] have claimed beneficial effects from treating with male hormone a small series of cases of painful enlargement of, and cysts in, the female breast. Patients with irregular, painful, or retarded menstruation and with menopausal disturbances are also stated by these authors to respond well to treatment with male hormone. Similar results have been recorded by Loeser[13] and by Foss.[14] The effect of androgenic substances on a physiological castrate has been studied by Hamilton,[15] who reported the case of a sexually under-developed male aged 27 in whom testosterone acetate and propionate caused definite growth of the genital organs associated with priapism. Similar results were reported by Foss[16] in one case and by Kenyon, Sandiford, Bryan, Knowlton, and Koch[17] in a group of seven cases. Carolli and Girrard[18] recorded a male aged 54 with testicular atrophy, absent beard, and deficient axillary and pubic hair associated with a myxoedema-like infiltration of the skin. They described the condition as the 'syndrome thyroïdo-testiculaire,' and found the polypeptide nitrogen to be increased to 0·186 grm. per 100 c.c. of blood. This fell to 0·036 grm. per 100 c.c. of blood after treatment with testosterone propionate, rising again to 0·069 grm. after cessation of treatment and falling again to 0·026 when it was once more resumed. This was associated with disappearance of the myxoedema-like infiltration, and with increased suppleness, of the skin. There was a return of erections, which the patient

[3] *J. Anat.*, Lond., 1938, **72**, 277.
[4] Ibid., 264.
[5] *Lancet*, 1937, **2**, 676.
[6] *Science*, 1938, **87**, 238.
[7] *Endocrinology*, 1937, **21**, 603.
[8] *Biochem. J.*, 1938, **32**, 1312.
[9] *Chem. Ind.*, 1936, **55**, No. 51, 1030.
[10] *Brit. J. Urol.*, 1937, **9**, 254.
[11] *Dtsch. med. Wschr.*, 1937, **63**, 1402.
[12] *Presse méd.*, 1938, **46**, 185.
[13] *Lancet*, 1938, **1**, 373.
[14] Ibid., 992.
[15] *Endocrinology*, 1937, **21**, 649.
[16] *Lancet*, 1937, **2**, 1307.
[17] *Proc. Soc. exp. Biol.*, N.Y., 1938, **37**, 683.
[18] *Bull. Mém. Soc. méd. Hôp. Paris*, 1938, **54**, 272.

had not had for a year. Experimental evidence shows that injection of male hormone in normal and castrated animals has a masculinising effect. Clinical evidence from the increased excretion of male hormone in sufferers from suprarenal cortical tumour with basophilism, or of virilism in females, also suggests a masculinising rôle for this hormone. The most obvious clinical applications of male hormone would appear to be, therefore, in men whose virility is incomplete or has regressed, and possibly in women whose uterus or breasts are over-active."

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PROGRESS IN CHEMOTHERAPY

In view of the growing interest in streptococcal infections, the following considered summary is reproduced from our contemporary, *The Lancet* (November 26th, p. 1245):—

"The rival claims of different sulphonamide compounds have immensely complicated the study of chemotherapy. No experimental method can be the final arbiter between them, even in such infections as can be readily and typically produced in animals: the task to be faced is one of clinical assessment on an unprecedented scale. Therapeutic practice at the present time varies from one country to another. In this country we are chiefly employed on what seems as promising a line of investigation as any—namely, a comparison of the merits for different purposes of sulphanilamide itself and 2-(*p*-aminobenzenesulphonamido) pyridine (M. & B. 693). That this drug far exceeds all others in its efficacy against pneumococci is beyond question; but whether its superiority extends to infection by other organisms remains to be shown.

"We published last week two favourable reports on its use in gonorrhoea: according to Dr. Lloyd and his colleagues at Guy's its effect is greater than that of sulphanilamide, and is such as to obviate the necessity (now emphasised by almost all other writers on this subject) of withholding treatment until the infection has elicited a response from the bodily defence mechanism. To judge by the conflicting reports of the past two years, gonorrhoea is not an easy disease in which to assess therapeutic effect. While Germany is swept by a wave of enthusiasm for Uleron, Cokkinis and McElligott write of this drug: "We wish to state quite definitely that its ultimate curative value in gonorrhoea is much lower than that of sulphanilamide, and that we disagree with those German authorities who claim for it better end-results and a distinctive or superior mode of action."[1] A letter from these authors appearing on p. 1264 also expresses some disagreement with the conclusions of Lloyd and his colleagues. About the treatment of meningococcal meningitis it will be even more difficult to reach final conclusions, for most investigators will find it impossible to secure a significant number of cases. Dr. Hobson, who has previously studied the action of other sulphonamide compounds in this disease, has now, with Dr. MacQuaide, successfully treated six cases with M. & B. 693, and their paper, appearing in our present issue, contains useful information, not previously available, on the absorption of this drug and the concentration attained in the cerebrospinal fluid. We also publish this week two single case-reports concerning staphylococcal infection. Of all acute pyogenic conditions, this is now the least satisfactory to treat, and convincing evidence that any drug will control it, as streptococcal infection can now be controlled, would be more welcome than almost any other conceivable advance. More extensive studies are very necessary, and treatment of the commoner, less serious, staphylococcal infections by these means might point the way to the best method of attacking the more serious ones.

"The almost miraculous action of M. & B. 693 in pneumonia is now within the experience of many, and Dr. Dyke and Dr. Reid's description last week of eight consecutive and carefully studied cases, whose response might be called monotonous in its regularity, suggests that here is the greatest achievement of all, if judged by its possible influence on mortality rates. Pneumonia kills by tens of thousands, and the majority of these deaths should certainly be preventable in the future. Here it is satisfactory to note that trials with the new drug are now in progress in the United States. Flippin and Pepper,[2] who record its good effect in two cases of pneumonia, declare their intention of giving the remedy an extended trial, and it is well that such studies should be undertaken on both sides of the Atlantic. Hitherto chemotherapeutic practice has varied too much from one country to another, and it still seems, so far as the continent is concerned, that new remedies from elsewhere have little chance of competition, and hence comparison, with national products.

"Meanwhile the fundamental question of how these drugs act is not being allowed to rest in the state of obscurity in which many-sided argument has kept it for so long. A conviction has been growing among English workers that this action is some direct interference with bacterial metabolism, hindering or preventing growth and thus naturally leading in the end to the death of the micro-organism. This hypothesis in its general terms received its clearest expression hitherto in the Bradshaw lecture by Dr. Whitby which we published a fortnight ago. It has recently been fortified by strong specific evidence in Lockwood's[3] observation that the bactericidal action of sulphanilamide *in vitro* is antagonised by peptone. This seemingly innocent and irrelevant fact is actually of profound significance. It not only explains the inconclusive results of many *in vitro* tests and the discrepancy between them and the effect achieved *in vivo*, but it appears to explain how the *in vivo* effect is produced. Streptococci grow in pure serum, or in serum containinng sulphanilamide if peptone is also added, as it usually has been in the broth containing the streptococci; but if the organisms are added in a medium free from peptone, sulphanilamide in serum kills them. This must mean that the drug prevents the bacteria from utilising the constituents of serum as foodstuffs, as for example by inactivating proteolytic enzymes. Lockwood also suggests that the survival of a large inoculum of streptococci in such mixtures is due to the pabulum afforded to the living by dead and disintegrated cocci, and that enhanced virulence in this organism is simply the breeding-out of cocci with a maximum capacity for breaking down complex proteins. These ideas bear the stamp of truth, and, as Whitby remarks, the key to all these mysteries is likely to be found in the study of bacterial metabolism."

(1) Cokkinis, A. J., McElligott, G. L. M., *Lancet*, Aug. 13th, p. 355.

(2) Flippin, H. F., and Pepper, D. S., *Amer. J. med. Sci.*, October, 1938, p. 509.

(3) Lockwood, J. S., *J. Immunol*, 1938, 35, 155.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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THE R.C.V.S. COUNCIL AND THE STATE VETERINARY SERVICE SCHEME

To the Editor of the Veterinary Record

Sir,—My attention has been drawn to a letter from Mr. J. C. Coleman published in your issue of January 28th, in which he uses the following words at the opening of the second paragraph: "So far as I know, no effort was made by the Council, R.C.V.S., or steps taken to advise or suggest to the powers that be as to the *imperative necessity of embodying the general practitioners* in the Veterinary State Medicine Scheme; any suggestions made on the subject to Council were always met by the ruling that 'We are an *administrative body* and this matter is outside our purview.'"

The italics are Mr. Coleman's and are no doubt intended to lay stress on the difficulty of getting any hearing whilst he was a Member of the Council, R.C.V.S.

But before bleating to the profession Mr. Coleman might at least have taken the trouble to ascertain the facts of what did occur when he was still a member of that much abused body.

I have before me the minutes of the Council Meeting held on January 14th, 1938, when the Parliamentary Committee reported on the *Agriculture Act*, 1937, *Part IV*: "That a Sub-committee be appointed to watch the interests of the Royal College of Veterinary Surgeons in any scheme put forward by the Minister of Agriculture under Part IV of the Agriculture Act, 1937, and that the Sub-committee have power to act."

At the Council Meeting held on April 8th, 1938, again in the proceedings of the Parliamentary Committee:—

"The Sub-committee met on January 25th, 1938, and a draft letter to the Secretary of the Ministry of Agriculture asking for particulars of the scheme about to be put forward by the Minister was considered and after amendment approved.

"The Secretary read the reply from the Ministry of Agriculture dated February 19th, 1938, explaining the allocation of duties between whole-time veterinary officers and part-time veterinary surgeons as a consequence of the transfer of functions from Local Authorities to the Ministry. The request of the College to be furnished with copies of any draft schemes under the Act would be borne in mind."

This report was accepted, but the Secretary was further instructed to communicate with the Ministry to emphasise the desirability of employing local part-time inspectors for the routine inspection of dairy herds.

These proceedings cover two Council Meetings and Mr. Coleman was present at both Meetings, but very conveniently seems to have overlooked the fact.

I do not propose to go into the whole question of the negotiations which were carried on by the N.V.M.A. at this time. Suffice it to say that the Council, R.C.V.S., were fully aware of all that was going on and had to be very careful lest any action they should take might affect the delicate and somewhat involved discussions then passing between the Ministry of Agriculture and the N.V.M.A., and anything the R.C.V.S. could do was done with a view to strengthening the hands of the N.V.M.A.

I trust, Mr. Editor, that you may find space for this somewhat discursive epistle, but at a time like the present when nearly everyone seems to want to have a kick at our profession and to applaud anything calculated to cause us damage and loss of caste, it is, I hope, not too much to expect that those who have criticisms to offer should at least verify their facts before launching forth as would-be saviours of the profession, who have been deliberately misunderstood over a period of 24 years.

The last 30 years cover perhaps the period of the greatest progress of our profession and I for one am proud to have been allowed to serve it for a considerable part of that period, and when all the hubbub of the Loveday Report is out of the way it will be found to have carried out no mean task. The future is bright if the profession is loyal to itself.

Yours faithfully,
J. W. Brittlebank.

Wimborne House,
Sawbridgeworth,
Herts.

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MEASURING THE TUBERCULIN REACTION

To the Editor of the Veterinary Record

Sir,—In the *Record* for January 7th there appeared an article by Mr. Hancock, of Beaconsfield, on "The elimination of some variable factors from the intradermal tuberculin test." The first thing I would eliminate would be all "ball-headed" calipers, and substitute for them the fool-proof handy little gadget which I have bought purposely for you to see.* I have one—though it is actually one inch larger—which I have carried in my pocket and used since 1926. I was told of it by my friend and colleague, Mr. Cartwright, of Dyserth, and I would not change it for any caliper whether "ball" or "cylinder" headed.

I have seen measurements taken with a "ball-headed" caliper which have undoubtedly been erroneous, giving rise at the time to an unpleasant difference of opinion between two veterinary surgeons over very important cases. Calipers may be all right for the *initial* measurement, but in measuring a "reaction"—whether negative or positive—there is the danger, when lifting up the skin to measure it, that the caliper may be placed or pushed too far down. This little instrument, however, cannot possibly do other than grip the actual swelling: you cannot go underneath it, and you get the absolutely correct measurement in the "twinkling of an eye"—no time lost; no thumb-screws to adjust; no hesitation as to whether the measurement is right or not. I recommend it to all those who have not got one. This particular one I obtained from "The Technical Supply Co.," Norfolk House, Carden Avenue, Withdean, Brighton, 6. (Price 2s. 9d.)

Yours faithfully,
H. Llewelyn-Jones.

Veterinary Infirmary,
Denbigh.
February 4th, 1939.

*Our correspondent encloses a rule of the type known to the trade as a boxwood slide gauge.